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MAY, 1957

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METAL FINISHING

DEVOTED EXCLUSIVELY TO METALLIC SURFACE TREATMENTS

FOUNDED 1903

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Barrel Finishing —

How and When to Use It

Surface Treatment and Finishing of

Light Metals

*Plating on Aluminum — Hard Chromium and
Non-Electrolytic Deposits*

Finishing Pointers

Removal of Condensed Water

The Modern Chlorate-Accelerated Phosphating

Bath

Advantages and Application

Science for Electroplaters

Chemical Surface Preparation — C

Complete Contents Page 45

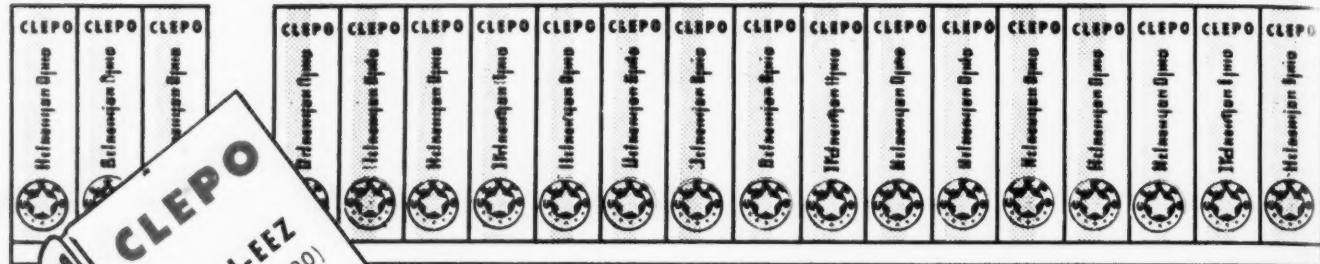


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(FORMULA 190)

**A NEW ACIDIC
RUST and SCALE
REMOVER**



- Free-flowing, dust-free, powder—not a liquid
- Rapid action—15 to 20 seconds often being sufficient; 2 to 3 minutes for heavy rust or scale
- Outlasts conventional pickling solutions, many many times
- No attack on base metal; leaves clean white surface
- No dimensional loss; no appreciable lustre loss
- No fumes or appreciable hydrogen gas
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- No smutting of high carbon steel
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If what you are using now causes trouble or excessive cost on any one of these points, ask your CLEPO Field Service Man to demonstrate the superior effectiveness of CLEPO 190. Remarkable results are being achieved.

* Patents pending

FREDERICK

GUMM

Chemical Company Inc.

538 FOREST STREET, KEARNY, N.J.

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RUST PROOFING
COMPOUNDS

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METAL BLACKENING
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Since 1930, ENTHONE Incorporated has developed and brought to the metal finishing market many specialty products and processes. Often these products have provided the answers to finishing problems previously unsolved. ENTHONE ENSTRIPS, for example, are patented products for the selective dissolving of one metal plated on another without attacking the base metal.

ENSTRIP A—U.S. Patent No. 2,649,361—was the first product ever offered for dissolving nickel plate without attack on the steel basis metal.

ENSTRIP 165-S—U.S. Patent No. 2,698,781—was the first product ever offered for dissolving nickel from copper base alloys without attack on the basis metal. And there are many other selective strippers in the ENSTRIPS group to meet all requirements.

If you have a metal finishing problem, ask ENTHONE *first!* Write now for the folder "They are HERE..." describing **20** ENTHONE answers to difficult finishing problems.



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answers many questions that mean better production, more profit for you. Just look at the table of contents:

Tank cleaning methods

Electrocleaning steel

Electrocleaning nonferrous metals

Pickling, deoxidizing, bright dipping

Applying iron phosphate coatings in preparation for painting

Applying zinc phosphate coatings

Cleaning, removing rust and conditioning for painting in one operation

Machine cleaning methods

Paint stripping

Steam-detergent cleaning

Barrel finishing, burnishing

Better cleaning in hard water areas

Treating wash water in paint spray booths

Rust prevention

Coolants and lubricants for machining and grinding

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You'll want to know the answers

Can one cleaning material do all metal-cleaning jobs? *See page 5.*

What kind of cleaner attracts both oil and water? How does this help remove buffering compound residues and pigmented drawing compounds? *See page 8.*

Why clean ferrous and nonferrous metals in separate tanks? *See page 10.*

What are the advantages of reverse current for electrocleaning steel? *See page 15.*

For electrocleaning nonferrous metals, what are relative advantages of cathodic, cathodic-anodic and soak-anodic cleaning? *See page 17.*

Can you electroclean brass without tarnishing? *See page 18.*

How do bright dips make metals brighter? *See page 21.*

Can you clean steel and condition it for painting for less than 20 cents per 1,000 square feet? *See page 24.*

Would you like a cleaner that removes rust and oil at the same time; often eliminating all need for pickling? *See page 28.*

What's the best way to clean parts that are too large to be soaked in tanks or conveyed through washing machines? *See page 30.*

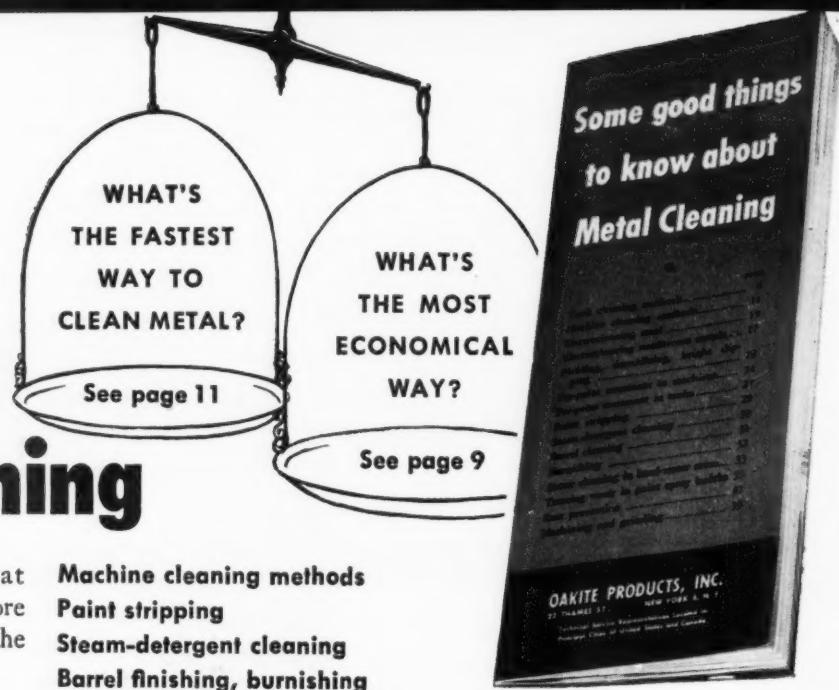
Does your burnishing barrel produce a luster you are proud of? *See page 32.*

What do you do when the overspray neither sinks nor floats in the wash water in your paint spray booth? *See page 35.*

Do you dry steel parts before anti-rusting? *See page 37.*

4/Circle on Readers' Service Card

Metal Finishing is published monthly by the Finishing Publications, Inc., 381 Broadway, Westwood, New Jersey, U.S.A. Entered as second class matter at the Post Office in Westwood, N. J. Volume 55, No. 5, May, 1957. Four Dollars Per Year.



FREE Write today for a copy of this 44-page, illustrated booklet.

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year after year has manufactured Reliance
Plating, Polishing Equipment, Supplies for
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Lucite — Hard Rubber or Bakelite Cylinders
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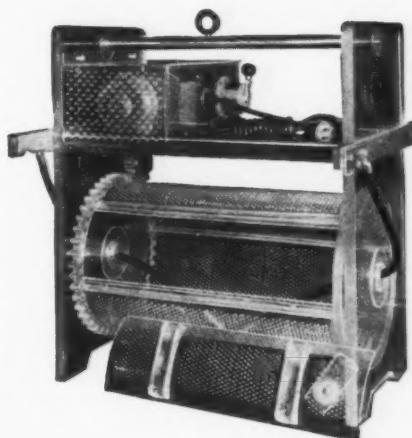
* * *

Write for Reliance Plating
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RELIANCE SELENIUM RECTIFIERS

Designed for all metal finishing operations.
 High power factor and low ripple.
 6 to 48 volts D.C.
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Built of extra heavy High Temperature Lucite for volume production and stability.
 Cylinder: 10" x 18" inside. Equipped with Reversing Switch to permit stopping and securing barrel for loading and/or unloading.

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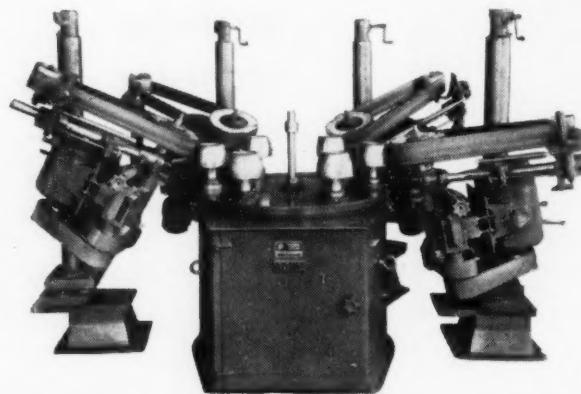
costs less when you
polish and buff the *Acme* way!

It's the gleam in stainless, the sparkle in chrome that sells consumer goods today—a fact that makes the finishing line your most important operation. Unfortunately it may also be your most costly. This problem can be solved, however, by Acme engineers with Acme polishing and buffing machines.

Reduction of costly rejects, increased volume of production, complete machine finishing of odd-shaped problem pieces—these are a few of the cost-reducing solutions that Acme engineers have provided for troubled manufacturers. The cost is low, too, because these engineers combine Acme-designed *standard units* and a wide variety of accessories to design a *custom machine* for your job.

LET ACME *Polish Off*
YOUR FINISHING PROBLEMS

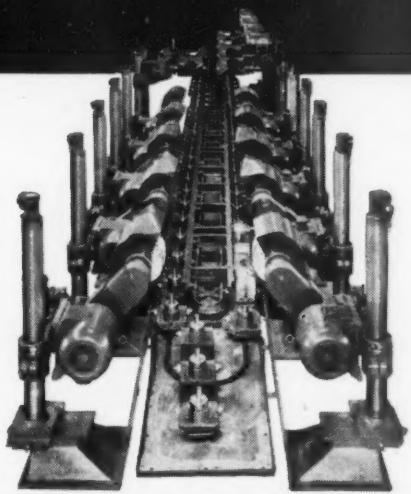
In plant after plant, Acme progressive engineering has built equipment that does it faster, and better, too. Every year Acme meets new parts and new finish requirements, each an individual problem. What's yours?



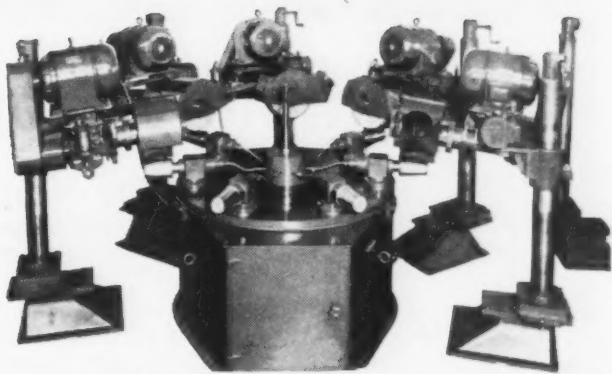
This Acme automatic 40-inch rotary with a six-station indexing table provides large volume polishing of cooking utensils. Four stations have Acme adjustable floating head buffing lathes with polishing belt arm attachments, and the remaining two stations are used for loading and unloading.

ACME MANUFACTURING COMPANY

LEADING PRODUCERS OF



Toaster bodies get fast, uniform buffing on this Acme 60-foot straightline conveyor with horizontal return. It is equipped with 16 heavy-duty adjustable floating head polishing and buffing lathes and universal indexing fixtures and adapters.



Vacuum chucking is featured on this Acme rotary automatic machine that buffs metal tumblers at low cost. This seven-station unit has five work stations and two loading and unloading stations. Typical of Acme flexibility, it easily changes to six work stations and one for loading and unloading.

1400 E. 9 MILE ROAD, DETROIT 20, MICHIGAN

AUTOMATIC POLISHING AND BUFFING EQUIPMENT SINCE 1910

METAL FINISHING, May, 1957

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when the finish
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USE CHROMIUM CHEMICALS BY MUTUAL

The gleam of superb chrome plating always raises an answering gleam in buyers' eyes. And in the plating shops which must achieve this mirror-bright finish, the chances are you'll find Mutual Chromic Acid. The reasons: Mutual Chromic Acid contains a CrO_3 content of 99.75% minimum, while sulfates do not exceed 0.1% SO_4 .

Mutual, the world's largest producer of chromium chemicals, has an enviable record of prompt delivery, even in periods of tight supply. Finally, Mutual is happy to give technical service where needed. Ask your supply house about Mutual chromium chemicals, or write Mutual direct.



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for assured maximum amperes in the entire 2V-12V range. Some selenium rectifiers provide maximum amperes just in the low 2V-7V range, and others just in the high 5V-12V range.

Only SILVERLINE, with its newly-designed twin-range transformer, assures maximum amperes in both ranges. Both with 5% ripples. A flip of the switch...and SILVERLINE—the Selenium Rectifier with the Built-in Twin—stands ready to meet practically all the needs of the plating industry.

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With assured maximum amperes for greater flexibility...greater dependability for continuous performance...and fully equipped with meters and shunt...SILVERLINE stands out as the indispensable all-around Selenium Rectifier.

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"More power to You!"

Pioneers in Selenium Rectifiers

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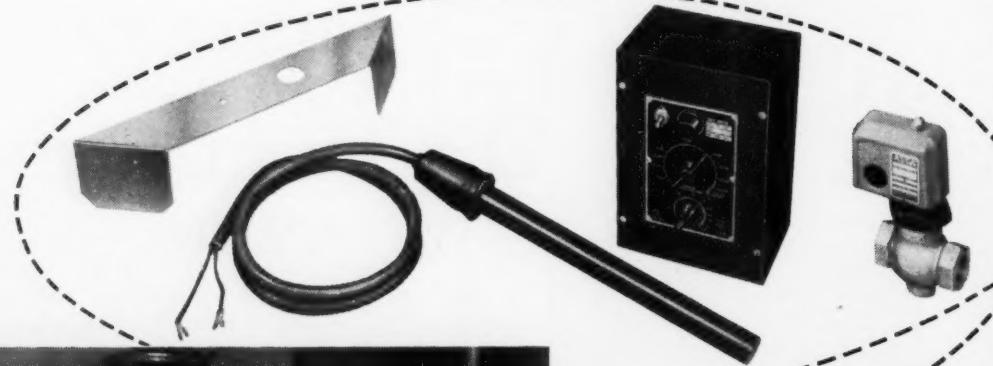
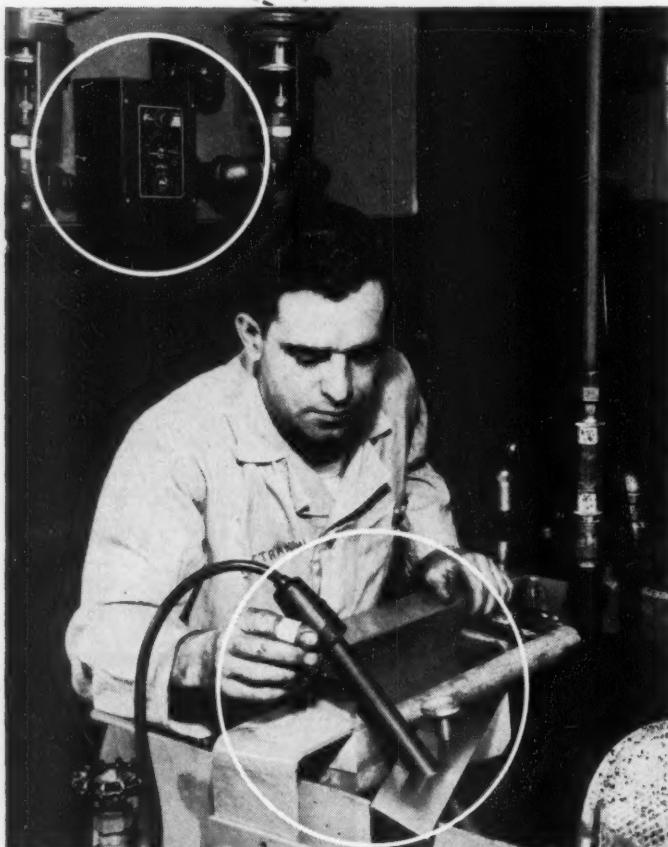
NEW YORK 61, N. Y.

TALMADGE 8-2200

SLASH YOUR WATER BILLS...

SOLU BRIDGE Automatic

RINSE TANK CONTROLLER



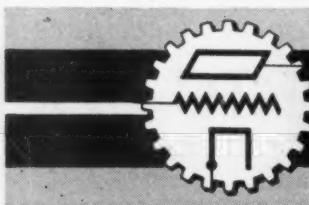
Water savings effected by a Solu Bridge Automatic Rinse Tank Controller installation are frequently more than 50%. An Eastern gold-plating plant, for instance, has reduced its water bill by a rate exceeding \$10,000 per year.

Furthermore, because of serious water shortages in many areas, as well as the growing influence of Federal Law No. 845 (making stream pollution a Federal responsibility), there is sharply increased interest by platers in the batch treatment of collected rinse waters.

The Complete Kit 1-1 shown above. Conductivity Cell is placed in rinse tank. Solu Bridge (conveniently located) automatically turns on and off a water valve for given degree of rinse. Typical installation at left.

GET YOUR COPY...

Descriptive bulletin gives working details and economics. Ask your supplier to show you this remarkably inexpensive equipment. Or write us. A post-card will do.



Industrial Instruments, Inc.

89 COMMERCE ROAD, CEDAR GROVE (ESSEX COUNTY), N. J.



"Harry, why did the boss switch to Dow Trichloroethylene?"

"That's simple, Jess—he figures it does a better job."

"In what way?"

"High solvent power, high stability. Superior degreasing performance thoroughly removes oils, tars and resins. Special inhibitors keep it stable after repeated degreasing and distillation runs. All around high quality."

"Nothing low down about this solvent, eh, Harry?"

"On the contrary. Relatively low boiling point makes it easier to handle the work after degreasing. And the narrow boiling range indicates the purity of the solvent."

"Sounds like it will do a good job."

"That's right, Dow Trichloroethylene does a good cleaning job and is safe to handle, too. Classified as nonflammable and nonexplosive at ordinary temperatures. Doesn't produce a flash by either the closed cup or open cup test."

"Say, Harry, sounds like you're selling this stuff."

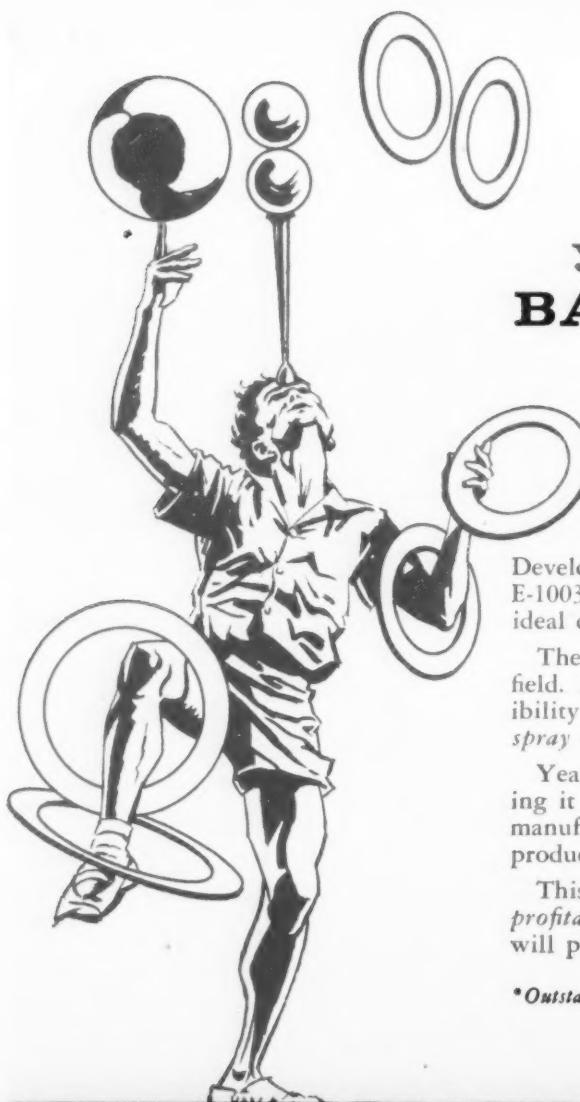
"I'm not, but Dow is."

"Who?"

"Dow. Same people who sell Dow Perchloroethylene Industrial for vapor degreasing, Dow Methylene Chloride for stripping and Chlorothene® for cold cleaning. THE DOW CHEMICAL COMPANY, Midland, Michigan."

YOU CAN DEPEND ON





year after year, you get
BALANCED QUALITY*
 in
MICCROSOL

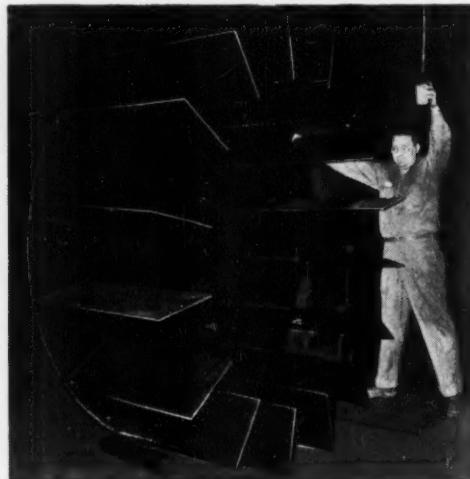
Developed originally as a coating for plating racks, Miccosol E-1003 has all the desirable characteristics which make it an ideal coating for many other applications.

The chemical resistance of Miccosol is unequalled in its field. Its toughness, abrasion resistance, resilience, and flexibility are unsurpassed. It's easy to apply in either a *dip* or *spray* formula. When necessary, it's easy to repair.

Year after year we build this quality into Miccosol, improving it whenever possible and practicing every economy in its manufacture that does not compromise the excellence of the product.

This **BALANCED QUALITY** enables you to use Miccosol *profitably* while assuring your customers of coating jobs that will prove superior in their performance.

*Outstanding performance and value



Developed and manufactured
 by experienced platers
 and coaters

For tanks,
 ducts, and
 other
 equipment

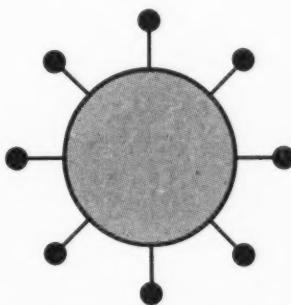
The above illustrations show Miccosol being used as a coating: At the left, Miccosol Spray S-2003 is being applied to a large plating tank. At the right, Miccosol E-1003 has been applied by dipping this large paddle. Contact us for the name of the qualified Miccosol coater nearest you.

It's Tops!

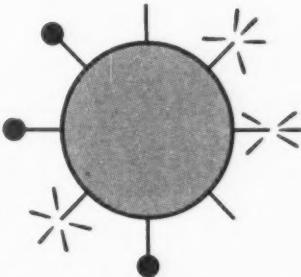


MICHIGAN CHROME and Chemical Company
 8615 GRINNELL AVENUE • DETROIT 13, MICHIGAN

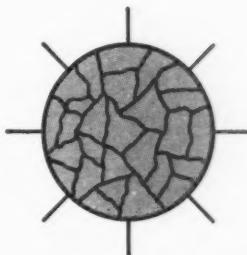
Does the solvent you use "go sour," like this?



1. The trichlorethylene you use for degreasing metal is protected by a stabilizer (small circles) against heat, light, air, moisture, acids and active metals like aluminum.

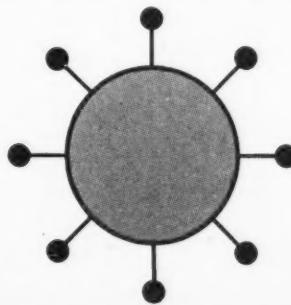


2. Ordinary stabilizers wear out or become depleted during normal use. With some solvents, you have to titrate your bath frequently, and may have to add fresh stabilizer.

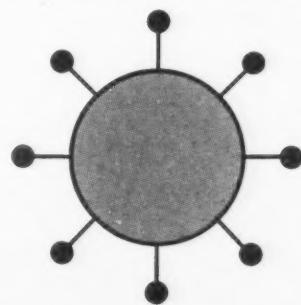


3. When stabilizer wears out, your degreaser doesn't function properly. It may even stain metal parts instead of cleaning them. You have to clean out the "sour" bath.

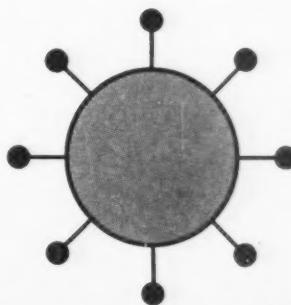
Use Nialk® TRICHLOREthylene and get **psp**... like this



1. You get full-time protection with NIALK stabilizer's unique action. Notice the difference between the next two diagrams and those above.



2. NIALK stabilizer does not wear out during normal use. It's always there, working. You never have to titrate your bath, or add fresh stabilizer.



3. Even after repeated distillations, you still have complete protection. All the stabilizer is active. Only NIALK has this **psp**—permanent STAYING power.

Why you pay less to degrease with Nialk® TRICHLOREthylene

The drawings above demonstrate a difference—a big, cost-cutting difference—between NIALK TRICHLOREthylene and conventional vapor-degreasing solvents.

NIALK has **psp**—permanent STAYING power—in its stabilizer. It's neutral, non-alkaline. You never have to replenish it.

psp means cheaper degreasing. You don't have to clean out your degreaser nearly so often with NIALK TRICHLOREthylene. You can degrease many more parts between cleanouts.

The NIALK stabilizer actively retards formation of degradation products in your degreaser—cleanouts are easier, faster.

Get proof of Nialk's cheaper, safer degreasing

See for yourself how NIALK with **psp** remains stable, keeps cleaning efficiently long after other solvents have lost their punch. Write on your business letterhead for a resumé of comparative metallurgical tests on five leading brands.

HOOKER ELECTROCHEMICAL COMPANY

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NIAGARA FALLS • TACOMA • MONTAGUE, MICH. • NEW YORK • CHICAGO • LOS ANGELES
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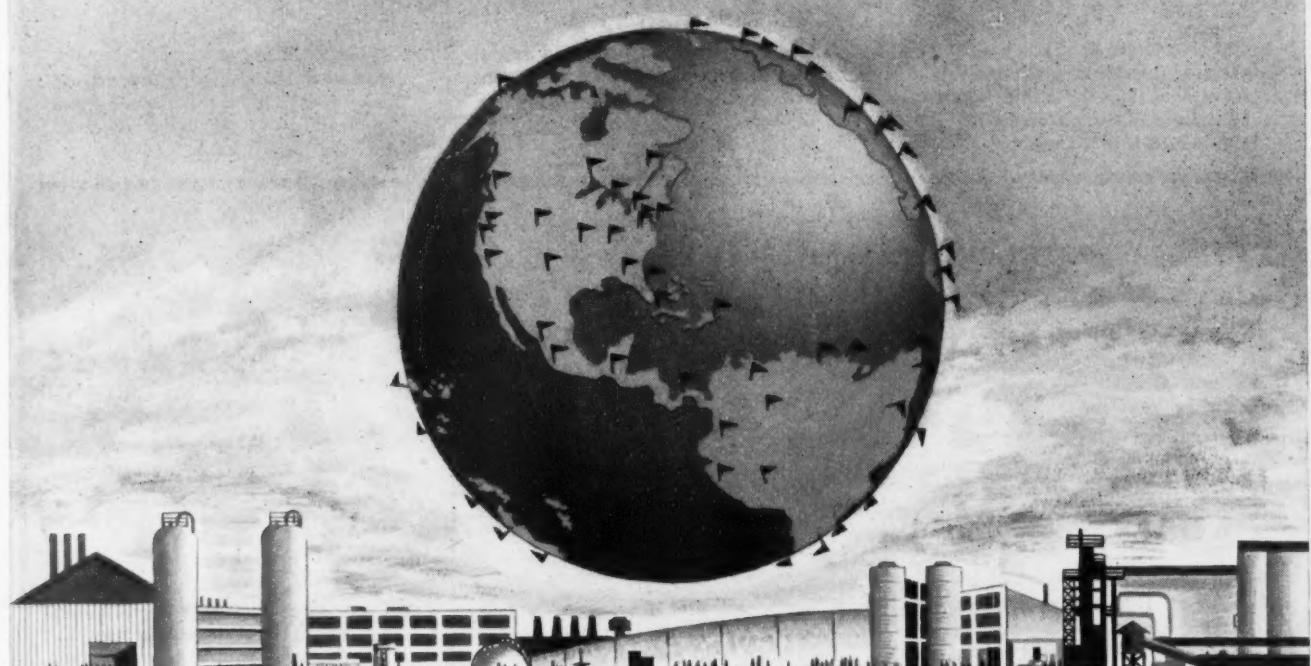
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663W38

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*for more than 15,000 customers in
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industries throughout
the world**

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Photographic
Porcelain Enamel
Plastics
Pottery
Printing Ink
Pyrotechnic
Refractories
Rubber
Shade Cloth
Soaps
Textile
Veterinary Remedies
Welding Electrodes
Wall Paper

Here are typical Harshaw chemical products

Electroplating Salts, Anodes and Processes	Fluorides
Organic and Inorganic Dry Colors and Dispersions	Glycerine
Driers and Metal Soaps	Preformed Catalysts, Catalytic Chemicals
Vinyl Stabilizers	Synthetic Optical Crystals
Ceramic Opacifiers and Colors	Agricultural Chemicals
	Fungicides
	Chemical Commodities

THE HARSHAW CHEMICAL CO.

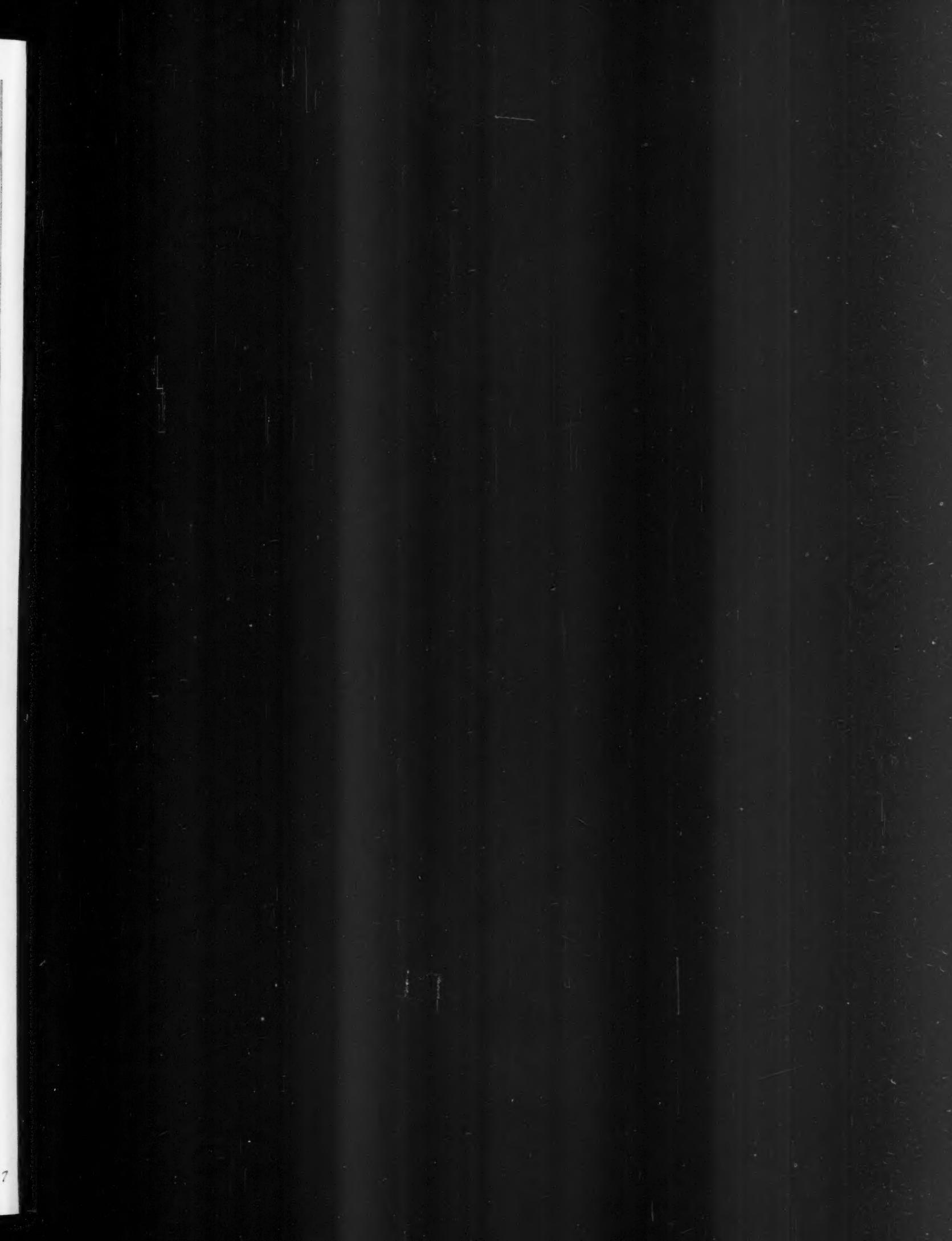
1945 EAST 97th STREET • CLEVELAND 6, OHIO

Chicago • Cincinnati • Cleveland • Hastings-On-Hudson, N.Y. • Houston
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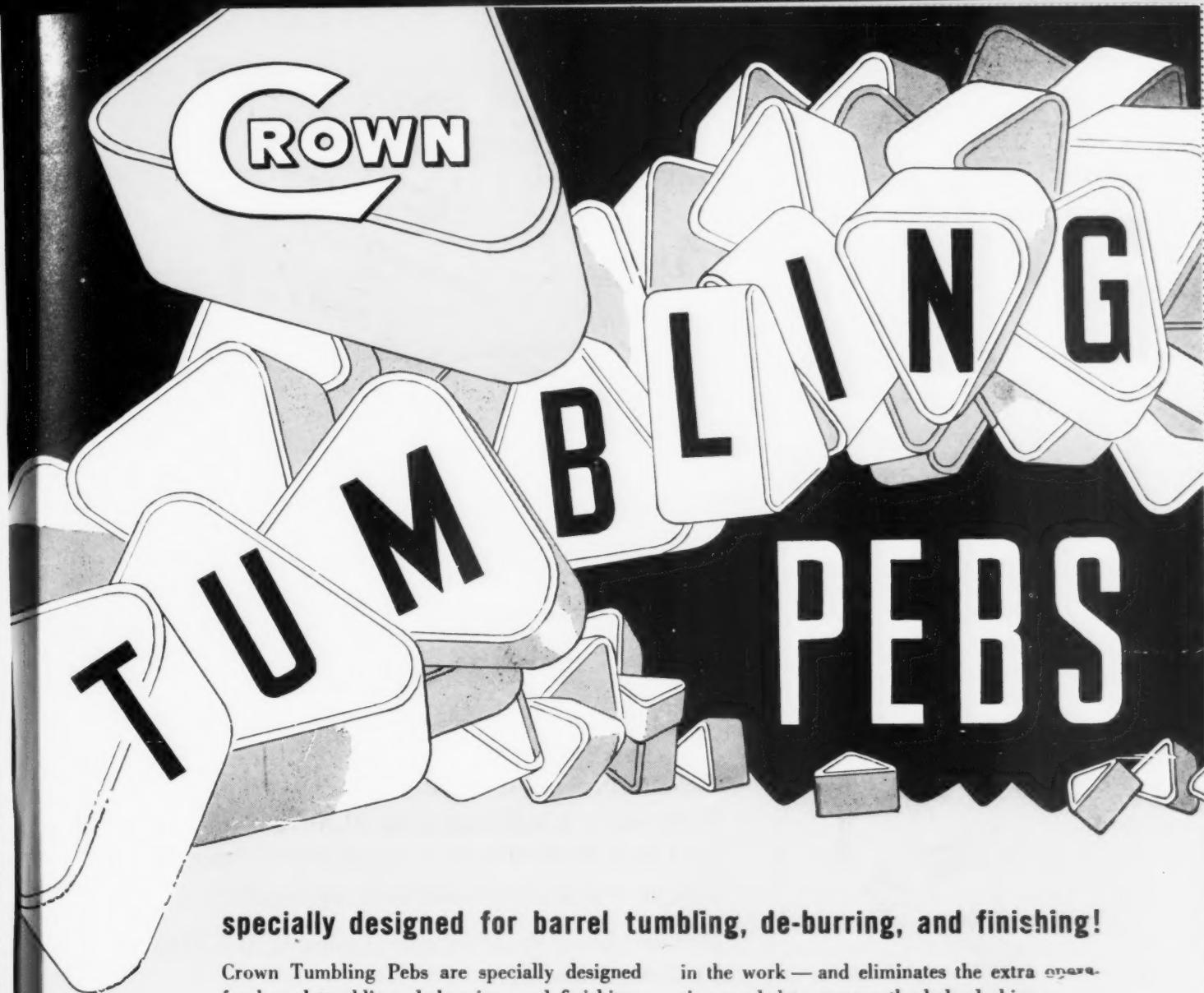
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many chemicals available from Harshaw.

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specially designed for barrel tumbling, de-burring, and finishing!

Crown Tumbling Pebs are specially designed for barrel tumbling, de-burring, and finishing. They are manufactured of a tough, white ceramic, uniform in size and shape, and available in a variety of sizes. Crown Pebs have many advantages in tumbling operations and are widely used for de-burring and similar tumbling processes in many types of barrel tumbling equipment.

Eliminates lodging in holes . . . Crown Pebs eliminate the "lodgement" hazard of random shaped chips. Just select the proper size, and the uniform size and shape of the Crown Pebs eliminates lodging in holes, recesses, and slots

in the work — and eliminates the extra operation needed to remove the lodged chips.

Longer life . . . The tough wear resistant ceramics in Crown Pebs give a service life several times longer than either natural stones or the aluminum oxide type of tumbling chips.

Crown Tumbling Pebs do not cut as rapidly as random shaped natural stones and aluminum oxide chips, but the uniform results and their much longer life make them very valuable in many tumbling and de-burring operations.

Samples sent on request.

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keep your
production
in the **BLACK**
with

BLACK MAGIC

as illustrated by the rehabilitation of small tools*

Final inspection is the measure of successful production. That's why it is important to use BLACK MAGIC as the black oxide finish. It meets or surpasses government specifications and all other black oxide specifications.

Here are a few of the advantages of using BLACK MAGIC for tool maintenance.

- Corrosion reduction
- Less chip adherence
- New tool appearance
- Sharper grinding
- Reflection reduction
- Improves cutting qualities
- Longer service life
- Reduces grinding time

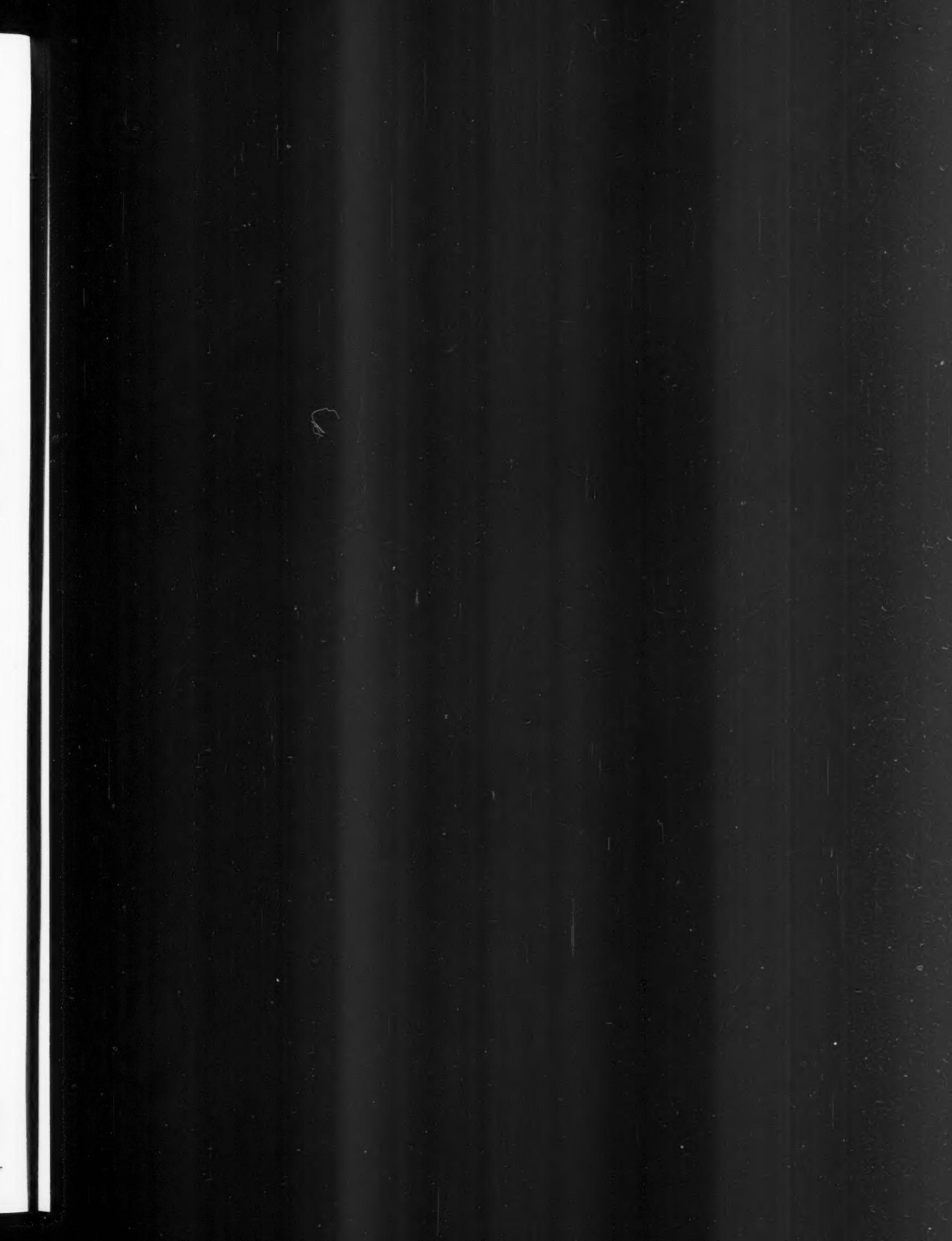
We would like to send you a reprint of an article entitled "New Life for Small Tools — Rehabilitation Treatment Cuts Resharpening 50%". It tells how manufacturers are saving thousands of dollars on tool maintenance.

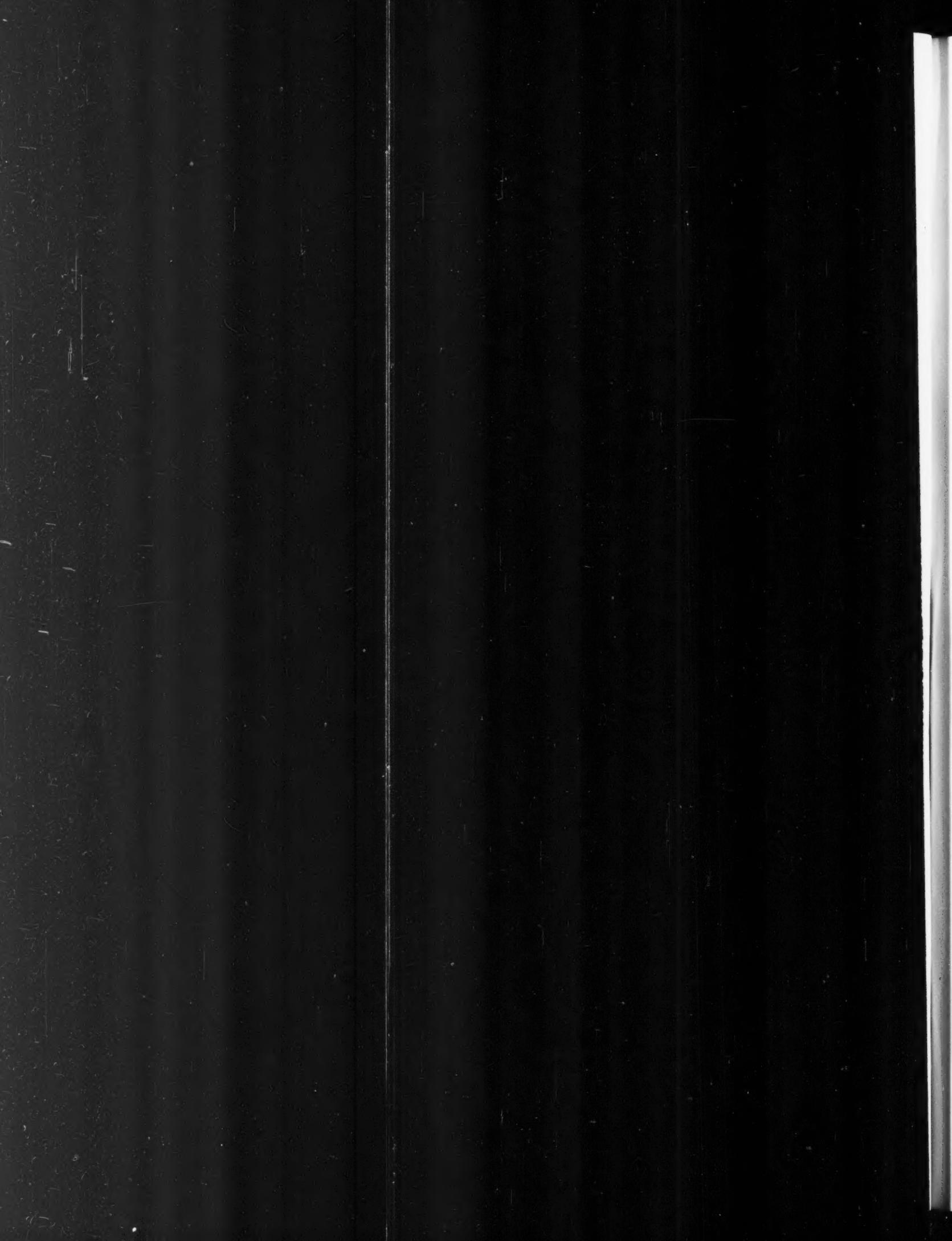
* BLACK MAGIC PROCESS U. S. PATENT #2,355,007

**Mitchell-
Bradford**

QUALITY PRODUCTS OF CHEMICAL RESEARCH







**Better, Faster,
Lower Cost Plating
of Small Lots!**

NEW!

LASALCO'S

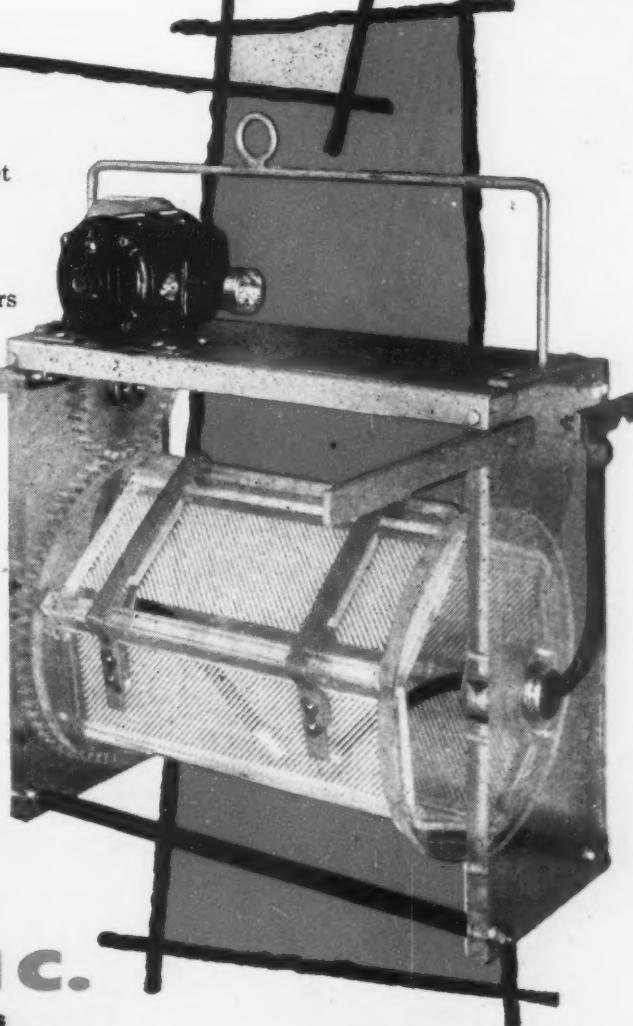
**Model 9 x 15 Utility
BARREL PLATER**

with High Temperature Plexiglas Cylinder

No Other Plater At Its Price Can Match It!

- Easy! Just hang it on the cathode rod in any plating tank and plug into nearest electric outlet
- Hexagon shaped cylinder has internal breaker strips to insure interchange of work necessary for more uniform plating
- Positive smooth 3-gear drive with Plexiglas gears eliminates plate-up on drive mechanism
- Dragout loss is cut to a minimum because barrel rotates as it is lifted from solution
- Double flexible connection insures positive contact
- Plexiglas cylinder resists all normal plating solutions and temperatures up to 180° F.
- Rugged, specially designed geared-type motor
- Nothing plates but the load—never any tree-up on cylinder
- Cylinder size 9" x 15". Hexagon shaped with removable door. Plastic-coated spring-type latches
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Wyandotte spray cleaners

keep parts clean, every step of the way!

Rust-inhibiting EXPRAY (AP)

For hot or cold use on all metals. Low, controlled foaming in all washers. Prevents rust; non-scaling with any water; works even with heavy soil loads.

EXPRAY (AP) is excellent for chip, grinding dust, and fabricating-oil removal in one-stage washers. Works well in multi-stage washers, too.

Low-foaming EXPRAY 541

This Wyandotte spray cleaner is highly silicated to provide built-in maximum detergency — removes heavy drawing compounds, buffing compounds, and machining oils. It is designed for use on all metals except aluminum; built for heavy-duty use with heavy soil loads; can be used in highest pressure washers without foam problems. Non-dusty, easy-to-handle.

Heavy-duty INDUSTRIAL No. 38

For heavy-duty spray washing, Wyandotte offers INDUSTRIAL No. 38. This free-rinsing, alkaline cleaner is essentially anhydrous — all cleaner. No built-in water.

Heavy-duty Industrial No. 38 has been an industry standard for years, unexcelled for handling those tough jobs on steel, brass, and zinc die castings.

New SPRAY-ALTREX

The newest and best spray cleaner for aluminum. Removes all aluminum soils, including stencil ink, without etching. Low foaming at all temperatures in all washers. For hot or cold use. A non-dusty product which gives excellent performance, even under the most adverse conditions.

Get free information today!

Wyandotte has custom-designed these cleaners to meet the problems encountered in spray cleaning between machining operations, and other special applications. To get details on how they can solve your particular spray-cleaning problems, contact your Wyandotte man, today. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California. Offices in principal cities.*

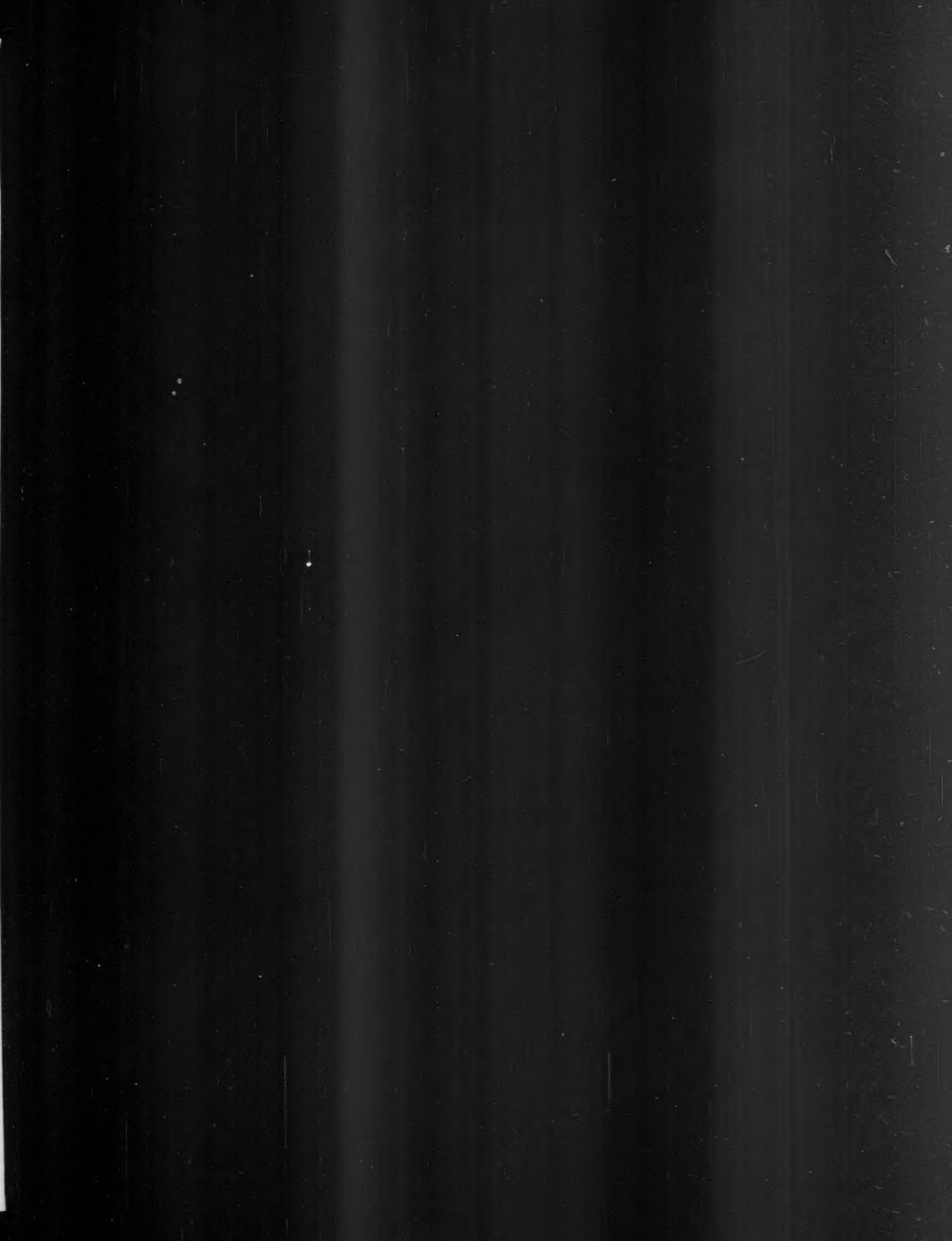


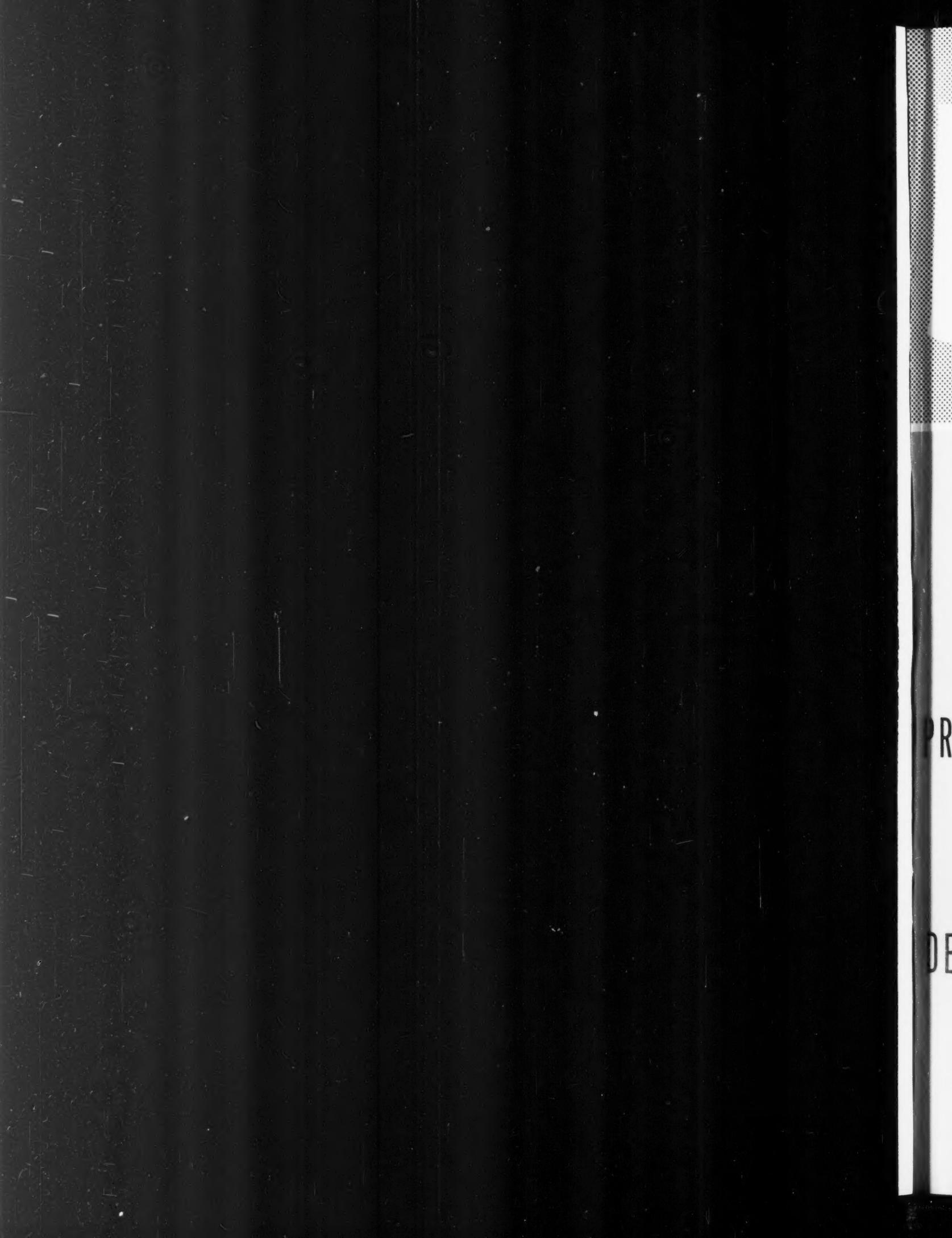
Wyandotte
REG. U. S. PAT. OFF.

CHEMICALS

J. B. FORD DIVISION

THE BEST IN CHEMICAL PRODUCTS FOR METAL FINISHING





New *Udylite*

ZB-57

FOR BARREL PLATING

Udylite Bright Zinc for barrel plating is an *entirely new* process which has been developed by The Udylite Research Corporation. By exacting comparisons, we find this new Bright Zinc Process to be the finest and most economical available. It has these outstanding features:

THE
PROCESS

- 1 ECONOMICAL IN OPERATION
- 2 EXCEPTIONAL PLATING SPEED
- 3 WIDE BRIGHT PLATE RANGE
- 4 CAN BE TAILORED TO YOUR JOB

THE
DEPOSIT

- 1 BEAUTIFUL BLUE-WHITE COLOR
- 2 BRIGHTEST PLATE WITHOUT BRIGHT DIPPING
- 3 RECEPTIVE TO CHROMATE TREATMENTS
- 4 EXCELLENT CORROSION RESISTANCE



SEE NEXT PAGE

WORLD'S LARGEST
PLATING SUPPLIER

ZB-57

FOR BARREL PLATING

ECONOMY OF OPERATION

EXCEPTIONAL PLATING SPEED

AN UNUSUALLY WIDE BRIGHT PLATE RANGE

CAN BE TAILORED TO THE JOB

BEAUTIFUL COLOR

BRIGHT DIPPING

RECEPTIVE TO CHROMATE TREATMENTS

EXCELLENT PROTECTION AGAINST CORROSION

TO BETTER SERVE THE PLATING INDUSTRY UDYLITE ANNOUNCES an entirely new zinc process for barrel plating which further improves economy, speed and appearance of bright zinc plating. Tests in both the Udylite Research Corporation laboratories and in the field during the past eighteen months have proven the accuracy of these claims.

is one of the important features. The zinc brightener is long lasting and stability is unusually good, even at elevated temperatures.

is attained with the new Udylite Bright Zinc Process for barrels. You can get up to 75% higher production per barrel and per man hour with this new process. It gives a beautiful bright zinc coating even at higher voltages.

Now more than ever you can get excellent color even though you are plating parts of complicated shapes with deep recesses. You will find a minimum variation in luster with the new Udylite Bright Zinc Process ZB-57.

since variations in process can be made to an exacting degree to meet your special plating need, whether it be for an exceptionally deep throw of the zinc plate or the highest demands for speed.

is obtained with this new process. Parts have a blue-white finish so highly desirable. The finish is unusually bright and far exceeds the accepted standards for a decorative bright zinc. It has a high eye and sales appeal finish.

can be eliminated in most cases with Udylite's Bright Zinc for barrel plating since the deposits are so bright and have such exceptional luster. With the use of this process you can enjoy a minimum of processing steps to obtain the highest quality finish.

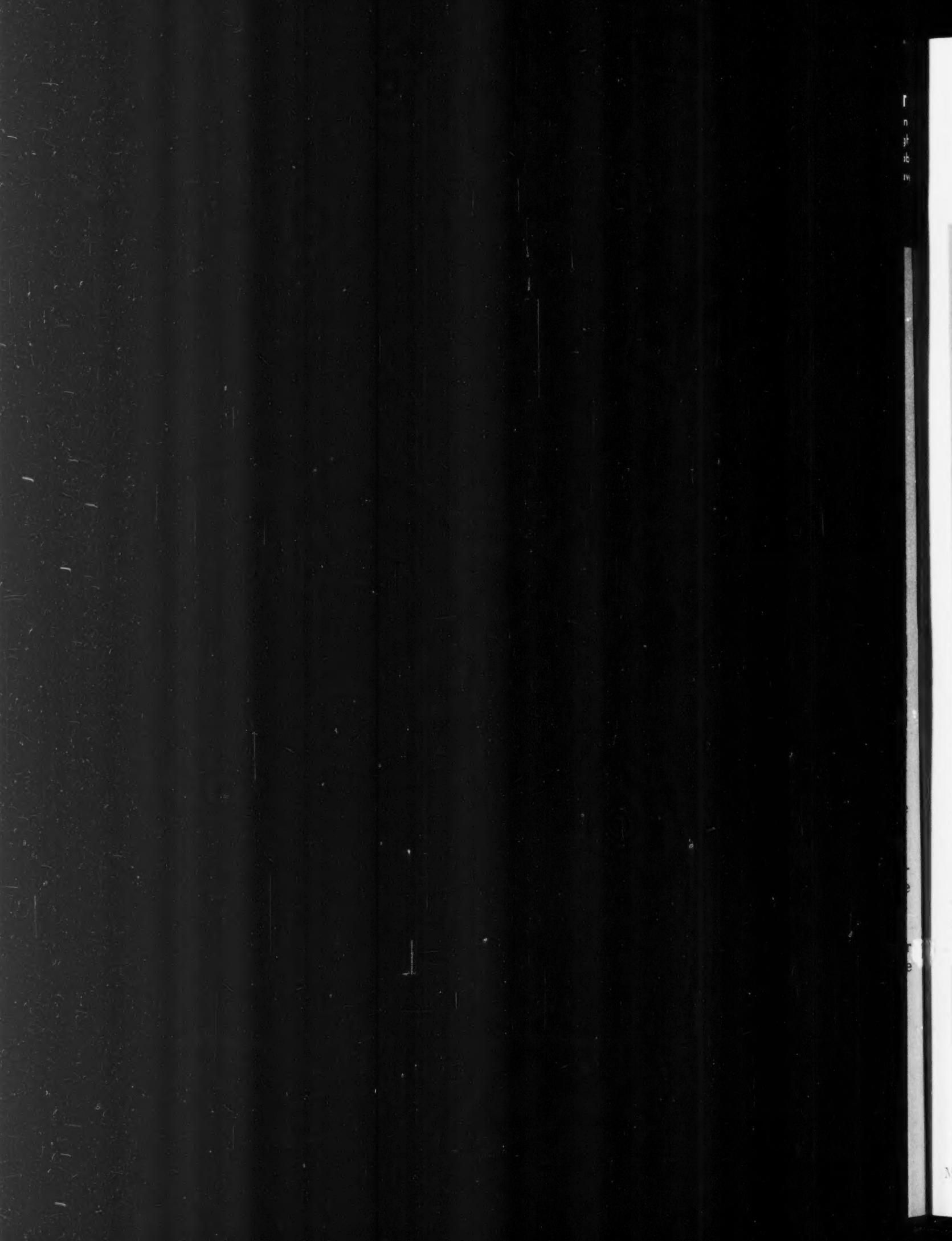
where desired. The zinc surface deposit is extremely receptive to chromate treatments or for other clear or colored post treatments.

The protection against corrosion afforded by a zinc coating is proportional to its thickness. This process is no exception. Users will receive more protection per dollar than ever before.

Consult your Udylite representative or write us directly about your needs for bright zinc plating in barrels. A test run of this new Udylite process will convince you.



WORLD'S LARGEST PLATING SUPPLIER





A Timely Message on The Sphere of the Purchasing Agent

by Ben P. Sax

Chairman of the Board, American Buff Company

What versions come to your mind when you consider the functions of the Purchasing Agent in any business? Desk man? Work-horse? Efficiency man? Source file? Quality Supervisor? Penny-pincher? Free-spender? Expediter?

Actually, the P.A. is a "combination package" of expert abilities which assure the procurement of the right product, part or system to produce results at lowest cost. Today, business relies ever more heavily upon these men who keep abreast of sources and products which can offset the increasing cost of man-power. New machinery and methods which free costly hands for more essential tasks, and speed or increase output, are significant advances in the fight to reduce overhead.

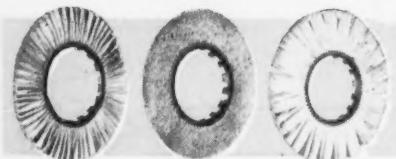
It takes fine discrimination, based upon wisdom, experience and field knowledge of all markets, products, and supplier dependability . . . plus familiarity with production costs and "purchase price" . . . to decide which actually costs less . . . the purchase that saves in original expenditure, or the higher-cost purchase that produces substantial savings in actual job performance.

Just as our own centerless buff developments have helped the metal finishing industry to multiply its production while substantially reducing costs and man-hours, many other modern products and mechanical brains and hands are being introduced by the P.A. in all fields. In any organization, P.A. is a title to wear proudly.

Sincerely,

Ben P. Sax

"For the job that's TOUGH—use an AMERICAN BUFF"

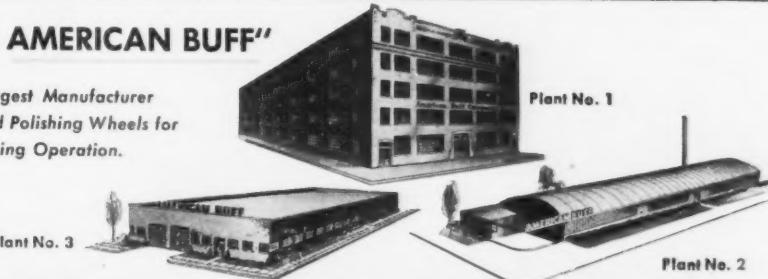


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Patented CENTERLESS Construction
Pat. No. 2,582,506

World's Largest Manufacturer
of Buffs and Polishing Wheels for
Every Finishing Operation.

Plant No. 3

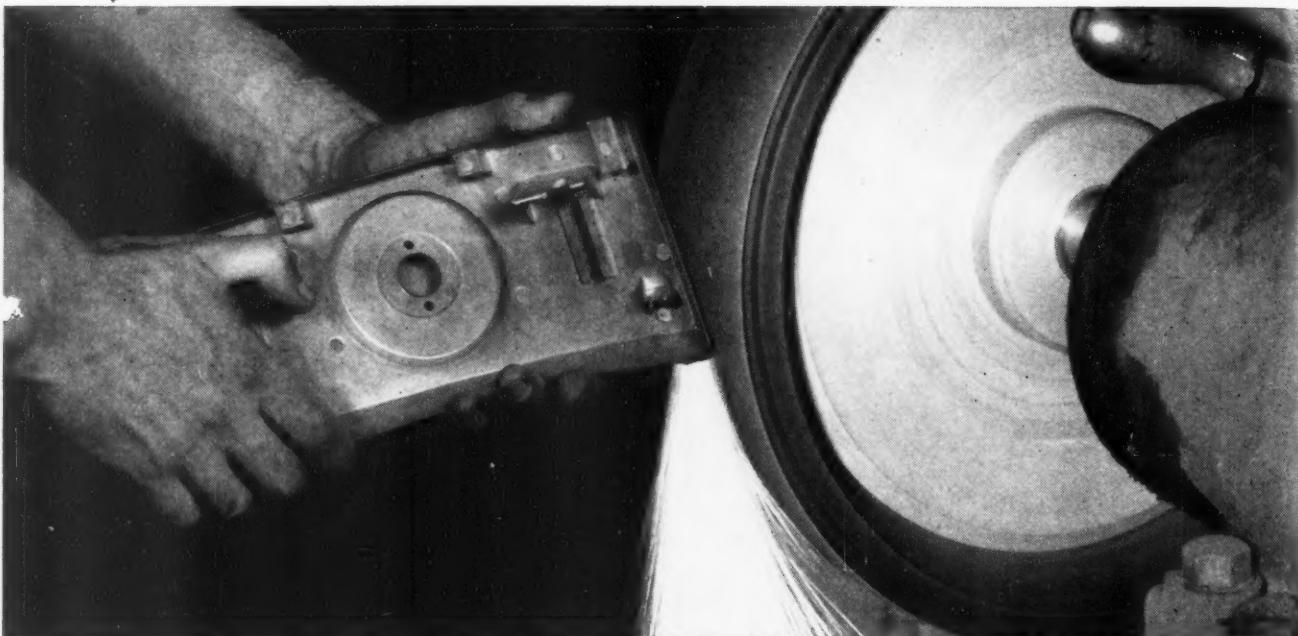


Plant No. 2

American Buff Company
2414 S. La Salle Street
Chicago 16, Illinois

AMERICAN BUFFS ARE REGULARLY ADVERTISED IN FORTUNE MAGAZINE

Increase Pieces-Per-Belt 30% OR MORE with MICHIGAN ABRASIVE BELTS



FACTS FROM TYPICAL MICHIGAN ON-THE-JOB FILE:

OPERATION: Backstand grinding-finishing die cast auto-trim parts.

FORMER BELT: Resin bond, 180 grit - 150 pieces per belt.

MICHIGAN BELT: **RED COAT** Resin bond, 180 grit - 250 pieces per belt.

66 $\frac{2}{3}$ % more pieces and nothing was changed but the belt!

Yes, it may be hard to believe but, it's true! And, as you know, nothing puts more value into sales dollars than a major cut in manufacturing costs! More and more people who *thought* they were getting peak production per belt are being amazed at the *additional* production they get from Michigan Abrasive **RED COAT** Resin belts, discs and sheets.

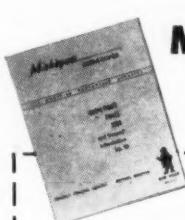
If you *think* you are getting maximum production and life from your present coated abrasives, you owe it to yourself, for the sake of profits, to test Michigan **RED COAT** Brand products in your operation. Only then will you *know* if your grinding and finishing costs are at rock bottom.

Michigan Abrasive is the fastest growing manufacturer of coated abrasives in the country . . . and no wonder! The proof is in *performance*. See for yourself what **RED COAT**, the sharper

cutting, cleaner cutting, smoother finishing brand of coated abrasives, can do for you. Call your Michigan representative today or mail coupon for free, complete catalog and representative will call you for appointment. Do it soon. You'll be glad you did!

MICHIGAN ABRASIVE CO.

Manufacturers of "The Humidity-Controlled Abrasive"
11911 E. 8-MILE ROAD • DETROIT 5, MICHIGAN



I want to know more about Michigan Abrasives.

Please send free Catalog Have representative call

Name _____

Title _____

Firm _____

Address _____

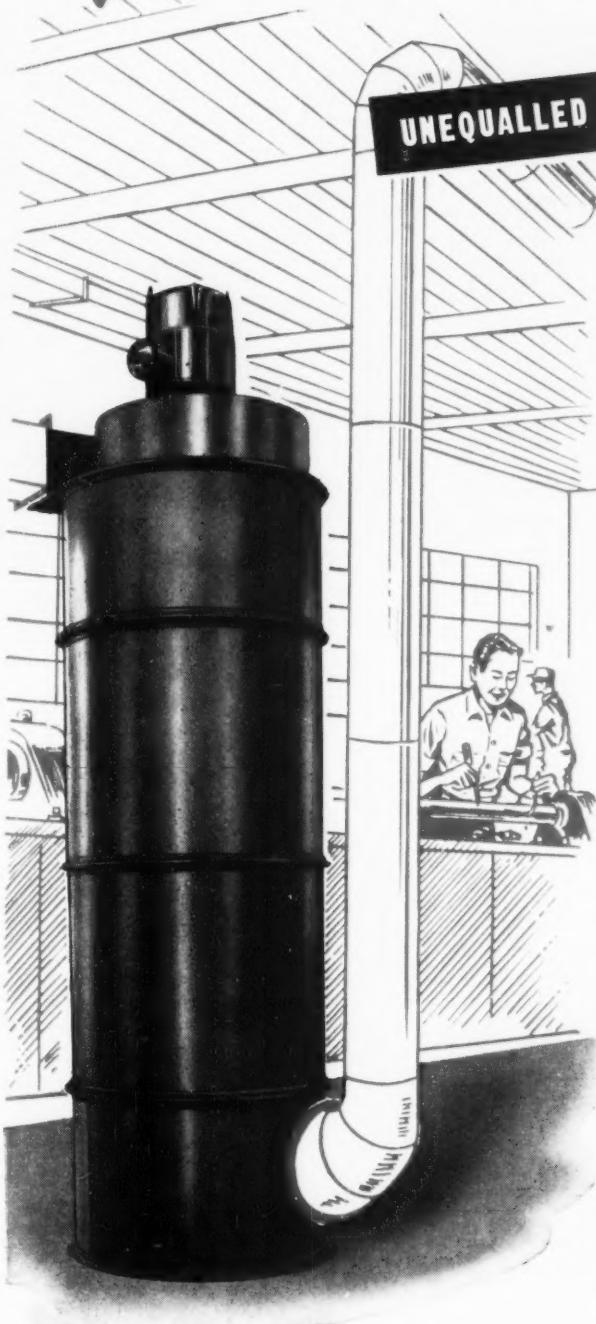
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RED COAT
BRAND

Michigan ABRASIVES

Cyclonaire - THE FIRST COMPLETE "PACKAGED" FUME WASHER PROVIDES



UNEQUALLED COMPACTNESS

GREATER FLEXIBILITY

SUPERIOR EFFICIENCY

The Cyclonaire is compact and inexpensive . . . yet so efficient it handles big fume removal jobs formerly requiring larger, custom built units. This increased capacity-to-size ratio is due in large degree to Intalox Saddle packing — the "heart" of the Cyclonaire. Intalox Saddles provide more useful wetted surface area, greater randomness of packing and a higher percentage of free space through the bed than any other tower packing. Thus fumes are more efficiently scrubbed at high C.F.M. rates, removing up to 99.9% of many gases in concentrations of 1% or less. The Cyclonaire safely handles corrosive gases in low concentrations.

You can order a Cyclonaire in any one of four standard "package" models, in capacities ranging from 750 to 6,000 c.f.m. However, many variations are possible to meet virtually every requirement. For instance:

When 100% fume removal is required, scrubbing action can be increased in any model either by adding additional packed sections or using two Cyclonaire units in series. If additional c.f.m. capacity is needed, two or more standard units can be used in parallel. Where elimination of dust or spray is the only problem, whole packed sections may be omitted or the amount of packing reduced. Where fumes are not soluble in water, absorbent chemical solutions can be employed by using recycling equipment. These are but a few of many variations possible.

The Cyclonaire is constructed of steel in easy-to-assemble flanged sections. Installation takes only a few hours, and it can be disassembled and relocated in a comparably short time. All inner surfaces are protected by a 3/32" thick corrosion-resistant Tygon lining. (The same basic lining that protects pickling and plating tanks.) Exterior surfaces are coated with Tygon ATD Hot Spray.



Write today for Bulletin FW-5
which presents detailed and
illustrated technical data.

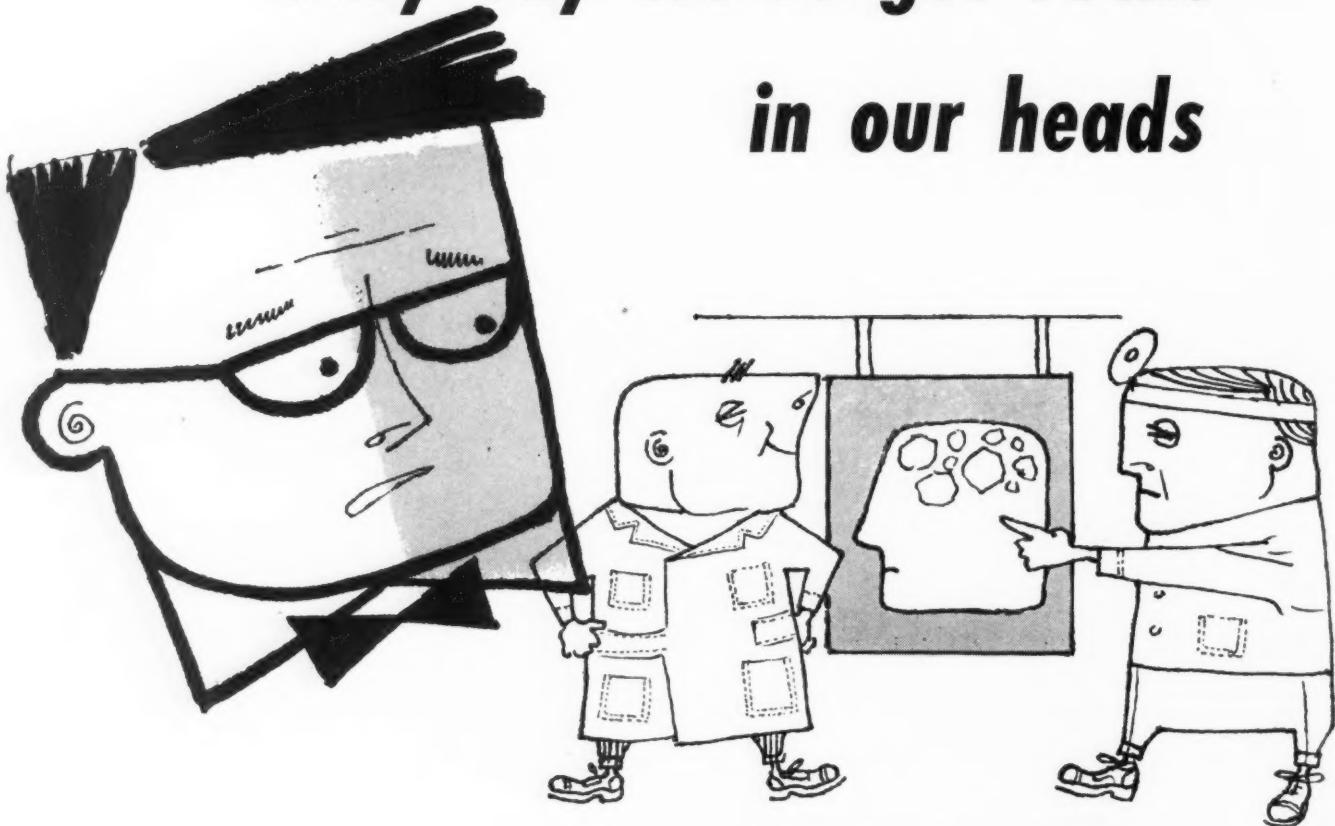
251-E

PROCESS EQUIPMENT DIVISION

U. S. STONEWARE
AKRON 9, OHIO

They say we've got rocks

in our heads



— and it's true!

We really don't mind this sort of talk. It's our business to have the types of "rocks" on our minds that are saving millions of dollars in the finishing of manufactured parts.

Roto-Finish people have studied abrasive chips and compounds since the day they pioneered the idea of precision barrel finishing. The development of new and better media for specific finishing problems has made Roto-Finish the leader in mechanical finishing. Years of research and experience in barrel finishing techniques give Roto-Finish the "know-how" to recommend the right media to do the job you want done.

If you're not satisfied with your finishing production, look to Roto-Finish for the answer. Simply send samples of your unfinished parts, a finished part, a description of your production requirements and a list of the

equipment you have available. We'll prove that you can save with Roto-Finish and we'll guarantee the same results in your plant that are achieved in sample processing.



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TECHNICAL DATA FOLDER
ON ROTO-FINISH PROCESSES

Roto-Finish
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3706 Milham Road
Kalamazoo, Mich.

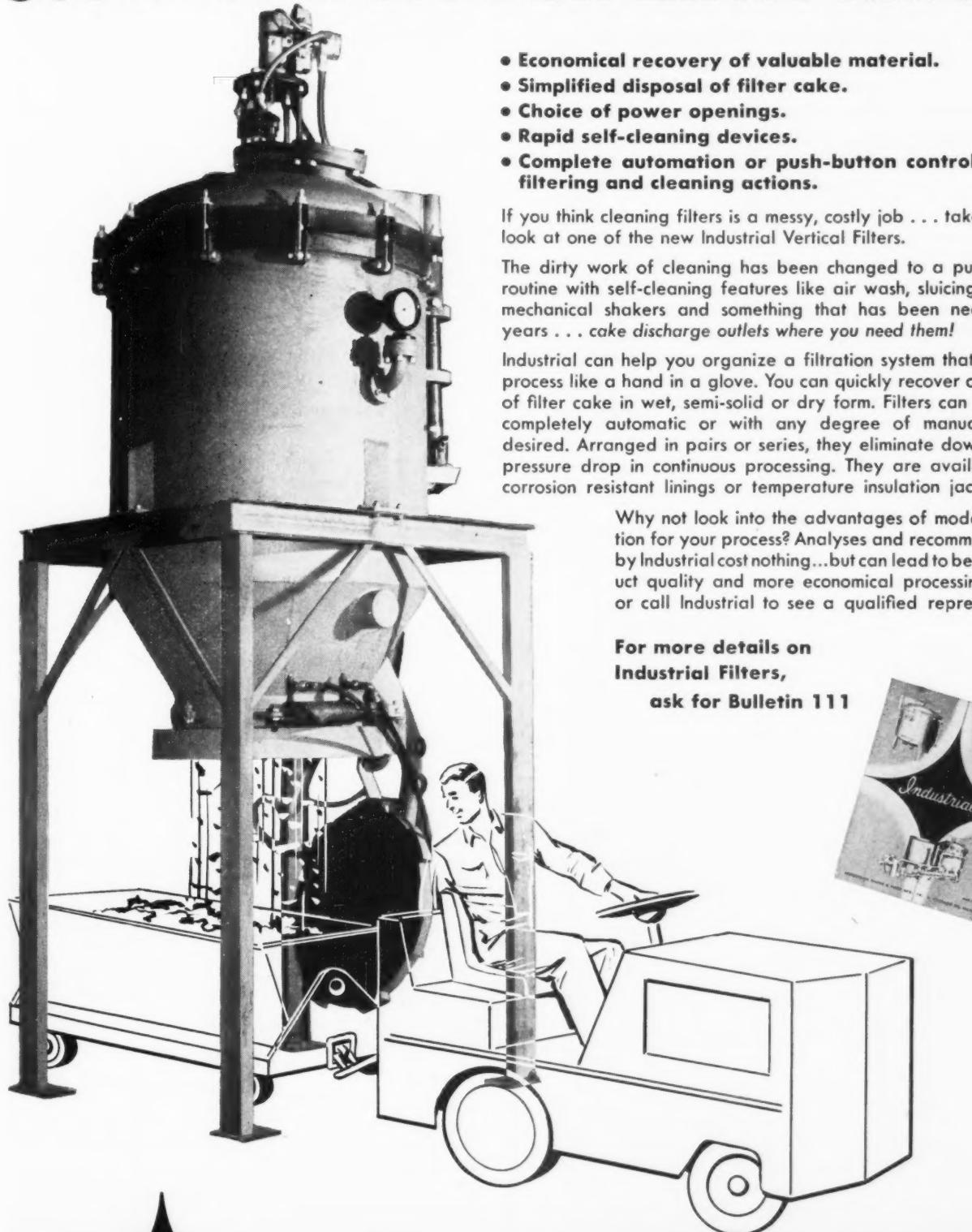


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See what these NEW filters can do!



- Economical recovery of valuable material.
- Simplified disposal of filter cake.
- Choice of power openings.
- Rapid self-cleaning devices.
- Complete automation or push-button control for all filtering and cleaning actions.

If you think cleaning filters is a messy, costly job . . . take a good look at one of the new Industrial Vertical Filters.

The dirty work of cleaning has been changed to a push button routine with self-cleaning features like air wash, sluicing devices, mechanical shakers and something that has been needed for years . . . cake discharge outlets where you need them!

Industrial can help you organize a filtration system that fits your process like a hand in a glove. You can quickly recover or dispose of filter cake in wet, semi-solid or dry form. Filters can be made completely automatic or with any degree of manual control desired. Arranged in pairs or series, they eliminate down time or pressure drop in continuous processing. They are available with corrosion resistant linings or temperature insulation jackets.

Why not look into the advantages of modern filtration for your process? Analyses and recommendations by Industrial cost nothing...but can lead to better product quality and more economical processing. Write or call Industrial to see a qualified representative.

For more details on
Industrial Filters,
ask for Bulletin 111



Industrial

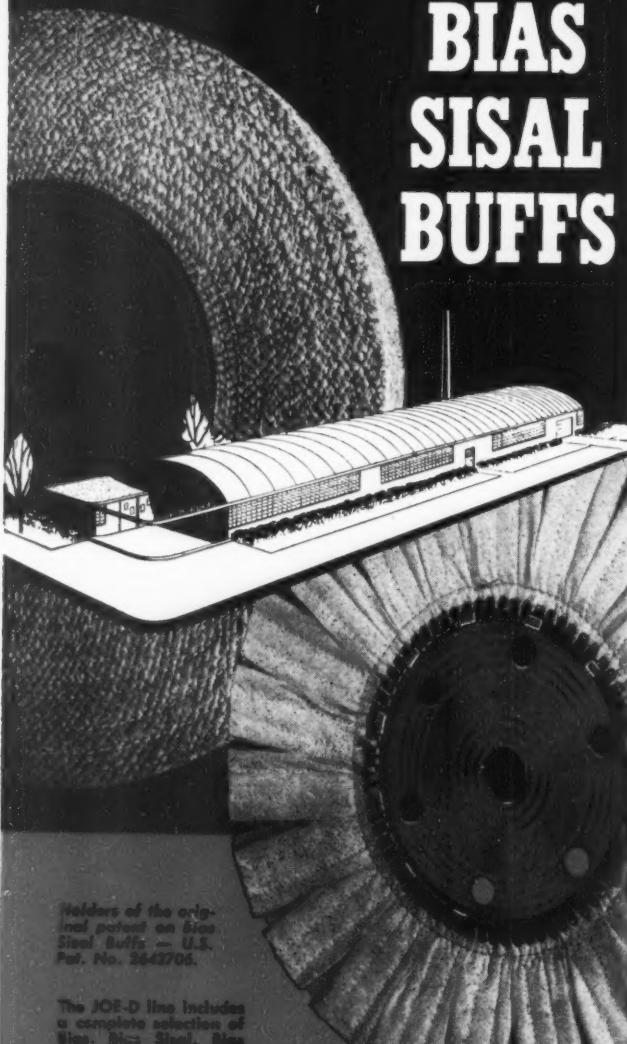
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FILTER & PUMP MFG. COMPANY
5906 OGDEN AVENUE • CHICAGO 50, ILL.

The "House that Sisal Built"

JOE-D ... Originators of

BIAS SISAL BUFFS



Holders of the original patent on Bias Steel Buffs — U.S. Pat. No. 2642706.

The JOE-D line includes a complete selection of Bias, Bias Steel, Bias Spike (Finger), and Conventional Buffs—as well as quality Polishing Wheels.

Since its founding, the JOE-D Buff Company has specialized in Sisal—constantly experimenting and testing ways to give you faster-cutting, longer-lasting Sisal Buffs. Made of the finest quality imported sisal, specially woven and processed for guaranteed fray-proof performance . . . never a loose end to whip or scratch . . . always an even nap to hold compound and provide better color. For every Sisal Buff requirement, specify JOE-D, the original—and still America's finest—Bias Steel Buffs.

ATTENTION JOBBERS: Some choice territories are still available. Write today!

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**LAMINATED
FIBERGLASS FOR
CORROSION RESISTANCE**



TANKS
Fabricated
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Specifications

NO MOLDS NEEDED—Made any size, any shape, at no extra cost and no loss of delivery time.

UNIFORM DIMENSIONS — NO TAPERING—Dimensions are same at bottom and top . . . means larger capacities than tapered molded tanks.

FLANGES, DAMS, Etc.—Can be inexpensively equipped with flanged connection, holes, overflow dams, baffles, separations, etc.

CHEMICALLY RESISTANT THROUGHOUT—Fabricated from **iolyte** sheet properly reinforced. This is a structural material . . . not a lining.

Write for literature, prices, and table of chemical resistance for **iolyte** tanks, crocks, ducts.

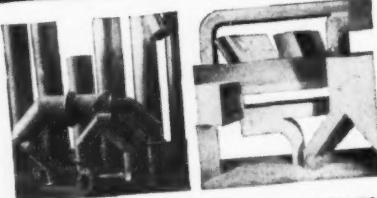


Available
from Stock

CROCKS

PRICE LIST

Gal. Cap.	Outs. Diam.	Outs. Hght.	List Cost	Gal. Cap.	Outs. Diam.	Outs. Diam.	List Cost
5	10"	16"	18.00	26	18"	24"	48.00
8	10"	24"	24.00	30	18"	30"	59.00
9	12"	18"	24.00	40	18"	36"	65.00
12	12"	24"	26.00	40	22"	24"	60.00
12	14"	24"	28.00	58	22"	36"	84.00
12	14"	24"	35.00	78	22"	48"	108.00
16	14"	36"	50.00	64	28"	24"	80.00
24	14"	36"	26.00	95	28"	36"	110.00
10	16"	12"	29.00	125	28"	48"	149.00
12	16"	14"	36.00	88	33"	24"	110.00
15	16"	18"	44.00	173	33"	48"	200.00
20	16"	24"	44.00	104	36"	24"	119.00
30	16"	36"	60.00	205	36"	48"	225.00
20	18"	18"	40.00				



DUCTS

ANY DIMENSIONS ANY CURVES ANY LENGTHS

iolyte has greater resistance to chemical attack than stainless, Monel, or aluminum. 1/5 the weight of steel, it is superior in tension, flexural, and compression strength. Unlike thermoplastics **iolyte** will not heat-distort below 350 deg.

Send drawings or prints for quotes and ask for literature giving chemical resistances.

Order from us or your distributor. Unless rated firm. payment with order. No COD's.

ALL PRICES F.O.B. FACTORY

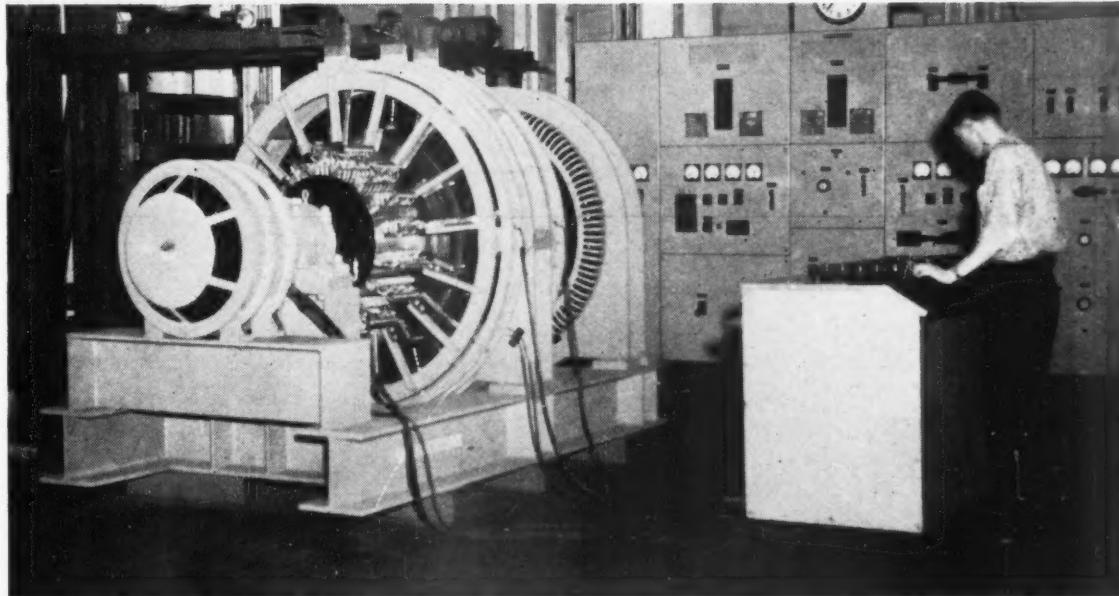
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prove that motor generators are your
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MOTOR GENERATORS ARE TESTED RELENTLESSLY

You can be certain of absolute dependability and top efficiency in a Chandeysson Motor Generator. Simultaneously, each generator is run for at least 12 hours at 110% of voltage and 115% of current before it leaves our plant. Tests prove time after time that efficiency and maximum voltage will not drop off with age as is often the case with other types of power conversion.

This is just one example of Chandeysson *performance* engineering. Behind every generator are decades of engineering and manufacturing know-how... consistent employment of only the finest, most durable materials... and user testimony to highest standards of performance and life-long service. For extra capacity to meet emergencies at the lowest possible cost... whatever your needs

are in power conversion equipment... insist on Chandeysson low-voltage generators.

GET ALL THE FACTS on how you can gain lifetime power dividends with a Chandeysson Motor Generator set. Mail this coupon... Now!

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15

WAYS TO BETTER METAL FINISHING

BY AHCO

For fast removal of buffing compounds from all metal surfaces, Lustrebrite Liquids 35 and 58.

For acid descaling and derusting of steel, Ahcoloid Cleaner #210, in convenient powder form.

For cleaning aluminum in power washers, Ahcoloid Cleaners #59-H-5 and 59-H-9, low foaming with high detergency.

For alkaline derusting of steel, Ahco Deruster #11.

For smooth, even deburring of metal parts, Ahco Nuggets, fast heavy-cutting natural aluminum oxide media — sizes from 10-mesh to large 1½" or 2" available.

For coarse cutting of steel and iron parts, Ahco Cutting Compounds #17-D-4 and #17-D-7.

For low-cost bright burnishing of copper and brass, NEW Ahco Burnishing Compound P.

For low-cost burnishing of aluminum, NEW Lustrebrite Liquid #50 AF.

For bright rolling of steel and iron surfaces, Ahco Burnishing Compound #44.

For high-quality, low-cost buffing of all metals, Ahco Liquid Buffing Compounds.

For finishing all metals as well as plastics, Ahco Greaseless Compounds.

For producing bright, ductile nickel deposits in barrels, Ahco Barrel Brighteners PI and SI. (Two-brightener system.)

For phosphating steel, zinc, and other metal surfaces, Ahcophos Compounds.

For economical inhibiting of sulfuric or hydrochloric acid on steel and iron parts, Ahco Acid Inhibitor.

For fast-drying, non-film-forming water displacing from all metals, Ahco Water Displacing Compound FD.

All of these outstanding products are the result of the Ahco Laboratories' continuing research and development program.

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Check blocks for FREE Bulletins
you want — mail this ad to
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WAGNER ISO-BRITE COPPER . . .



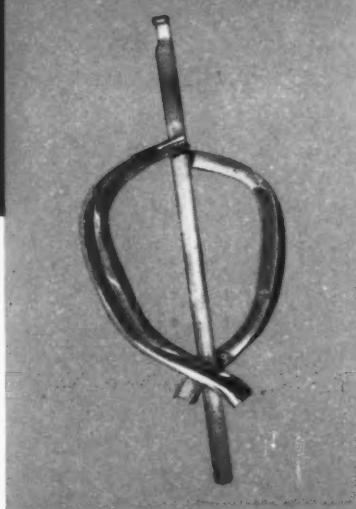
"The efficiency of your new Iso-Brite Copper bath will enable us to put a \$7500 'semi' to work on other jobs. We get a deposit of .0005" in a 15 minute cycle and could easily get .0006" to .0008" if required. Iso-Brite needs less maintenance than any bath within our experience." (Robert Hilfinger, Pres. Hilfinger Corp. to Jos. R. Wagner.)

doubles

Die cast automotive grill part ready for nickel and chrome.

SEMI-AUTOMATIC PLATING!

CONVERSION TO ISO-BRITE ELIMINATES ONE MACHINE . . .



The record at Hilfinger Corp., Toledo, Ohio, tells a simple story. This big, 115,000 sq. ft. die casting plant with a 200-man plating department originally required two semi-automatic plating machines for plating copper before nickel and chrome on large automotive die castings. New Wagner Iso-Brite Copper bath was installed eight months ago in one tank, replacing a leading proprietary copper bath, both machines being operated by a single generator. Excessive burning of the competitive plate resulted. The single machine charged with Wagner Iso-Brite Copper now turns out Hilfinger's entire production requirement to the customer's specification, permitting the surplus semi-automatic to be devoted to other production.

If reducing finishing costs is of interest to you, consider these reasons why this new Wagner-processed chemical is making records everywhere:

Wagner Iso-Brite Copper offers

1. Ease of control
2. High anode efficiency—copper cyanide additions virtually eliminated
3. Much heavier plate
4. Fine grained, dense, ductile, fully bright
5. Freedom from roughness
6. Wide operating range—temperature 135-165°; up to 60 amperes per square foot
7. High tolerance of organic contamination

Wire, phone or write for Bulletin 70.2 for full technical information on Iso-Brite Copper and the Wagner cadmium and zinc brighteners and chromate finishes. Please pass this advertisement along to your purchasing agent or plating superintendent. The Wagner man in your area will assist you with any plating problem.

400 MIDLAND AVE., DETROIT 3, MICHIGAN
CHICAGO • CINCINNATI • CLEVELAND • INDIANAPOLIS • NEW YORK • ROCHESTER • GRAND RAPIDS

Wagner
BROTHERS INC.



"Formulators of metal cleaning compounds prefer Dow Alkali"

Costs in your metal cleaning operation are directly affected by the cleaning agent used. Take into account how fast and thoroughly it cleans, as well as the purchase cost. If it doesn't clean with top efficiency, chances are your over-all cleaning costs are not as low as they could be. Many plants have cut costs substantially by switching to

products made by formulators who use Dow Alkali. The reason is simple: Dow Sodium Orthosilicate and Dow Caustic Soda deliver the highest alkaline cleaning power you can buy for any price.

Why not give it a try? **THE DOW CHEMICAL COMPANY, Midland, Michigan, Department AL 608K-1.**

YOU CAN DEPEND ON



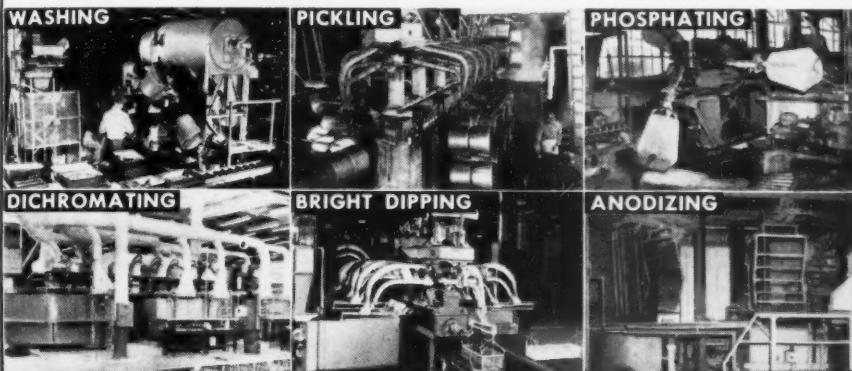


THE FINISHING TOUCH

A. B. HOEFER, Vice-President, FREDERIC B. STEVENS, INC.

AUTOMATIC IMMERSION PROCESSING RESULTS IN REAL SAVINGS!

MORE AND MORE, PROCESS ENGINEERS are recognizing the money savings to be realized from automatic processing installations, i.e. Anodizing and other aluminum immersion treatments; Blackening; Bright Dipping; Dichromating; Cleaning; Pickling; Washing; Phosphating for rust prevention; wear resistance, and prior to cold drawing; Stripping as well as Electroplating.



These Stevens Automatic Processing Machines are cutting costs.

"PROFIT-MAKING MACHINES" was one term recently used by a Stevens Automatic Machine user. Money saved in labor, floor space, production control and similar costs, if tacked on the other end, could very easily be termed "profit."

IN ANALYZING AUTOMATIC MACHINE USERS at Stevens for the past three years we were interested in the increased number of processing applications which manufacturers are adapting to this versatile equipment.

AUTOMATION HAS INFLUENCED THESE INCREASES, for our automatic machines fit ideally into "straight line" production layouts and eliminate handling and human error so costly in today's modern manufacturing techniques. All of our machines can be equipped with automatic load and unload features and have flexibility which enables them to be used for a variety of metal treatments.

IF YOU ARE A PROCESS ENGINEER, or occupy a similar post of responsibility in your plant, contact your Stevens sales engineer or write for more information on automatic immersion processing as well as electroplating. Let us show you how you can recommend methods to save your company money. Write: Frederic B. Stevens, Inc., 1800 Eighteenth Street, Detroit 16, Michigan.

CUT YOUR BUFFING COSTS WITH STEVENS LIQUID COMPOSITIONS

Stevens Laboratories have developed many new liquid buffing compositions for aluminum, zinc, copper, brass, nickel and stainless steel.

These safe, stable non-flammable liquid compositions are available in many grades to meet all cutting requirements.

Stevens Liquid Compositions increase buff life . . . reduce compound waste . . . cut labor costs.

Let us demonstrate how Stevens Liquid Compositions will work for you. Write Frederic B. Stevens, Inc., 1800 18th Street, Detroit 16, Michigan.

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STEVENS**
INCORPORATED
YOUR METAL FINISHING SUPERMARKET
DETROIT 16, MICHIGAN



Another

Richardson  Allen

Engineering "First"

Demonstrating the same unsurpassed initiative, ingenuity and craftsmanship which, over the years, have set the pace of progress for the entire industry. Richardson-Allen engineers—working in close cooperation with Westinghouse engineers—have developed and perfected the ultimate in power rectification.



SILICON DEPENDABLE POWER RECTIFIERS

HERMETICALLY SEALED JUNCTIONS —
HIGH TEMPERATURE OPERATIONS

VERSATILITY—Richardson-Allen silicon rectifiers are now available for the plating and industrial fields in ratings up to 500 kws.

EFFICIENCY—Richardson-Allen silicon rectifier units are now supplying major industries with an unprecedented amount of direct current—with no loss in efficiency, no aging and no apparent limit to the life of the silicon junctions. Single silicon junctions are designed to withstand up to 300 piv.

ECONOMY — Occupying unbelievable small space, the initial cost is often lower than other conversion methods; practically no maintenance is ever needed and when installation savings and power savings are figured the total amount is impressive.

For additional information, write to:



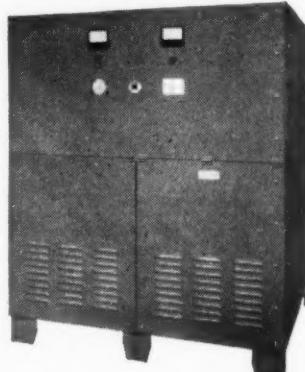
RICHARDSON  ALLEN Corporation

DEPENDABLE RECTIFIER SPECIALISTS

a Manufacturing affiliate of

WESLEY BLOCK & CO., INC., 116-15 Fifteenth Ave., College Point, L. I., N. Y.

IN CANADA: Richardson-Allen of Canada, Ltd., 1236 Birchmount Rd., Scarborough, Ontario



safe acids
that
leave fine metals
clean as a...



PFIZER CITRIC & TARTARIC ACIDS

With Pfizer Citric or Tartaric Acid you can develop a household cleaning product that gets metals "clean as a whistle"—safely!

The MILD ACTION of citric and tartaric acids in your cleaning preparations effectively removes tarnish and oxides from fine silver, copper and copper alloys. Citric acid is also notably successful in solving the difficult problem of formulating an aluminum cleaner that is both safe and efficient. The mild acidity of citric acid removes oxidized coatings from aluminum surfaces with negligible attack on the virgin metal.

In addition to being safe for metals, Pfizer Citric and Tartaric Acids are NONTOXIC—

an important human safety feature for your product, both in its manufacture and its use by consumers.

Pfizer offers a third nontoxic organic acid that's useful for cleaners and polishes. It is gluconic acid. Salts of gluconic acid, and of citric and tartaric acids, are available from Pfizer, too. Write Pfizer for *Technical Bulletin 61* which describes the many applications of Pfizer Organic Acids in metal cleaning, polishing and plating.

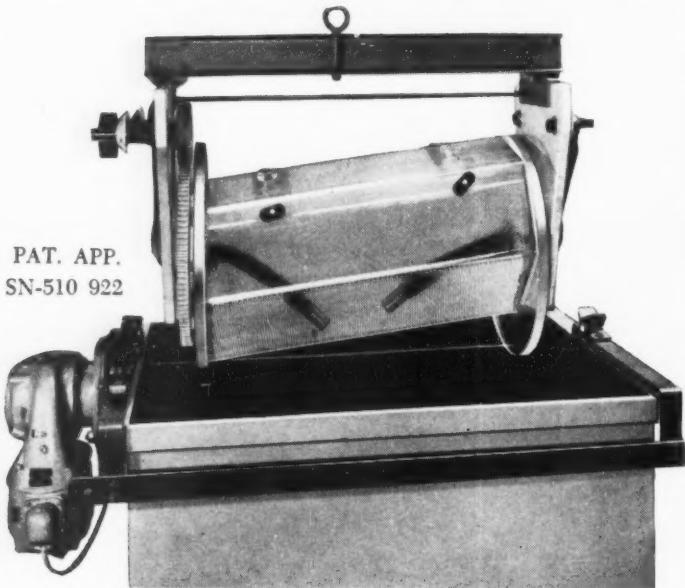
CHAS. PFIZER & CO., INC., Chemical Sales
Division, 630 Flushing Ave., Brooklyn 6, N. Y.
Branch Offices: Chicago, Ill.; San Francisco, Calif.;
Vernon, Calif.; Atlanta, Ga.; Dallas, Tex.

manufacturing
chemists
for over
100 years

Pfizer

**HOW MUCH
are YOU Losing
with conventional cylinders**

**our guess is
\$100⁰⁰ per month
per cylinder**



Uniform Plating makes the difference

With BELKE DOUBLE OSCILLATING CYLINDERS triple mixing action stirs, turns and moves the work across the cylinder. Every side of every piece gets uniform exposure to plating current.

You eliminate under-plating and over-plating. You don't have to over-plate most of the work to get the minimum deposit required on all the pieces.

You reduce plating time up to 20% with corresponding savings in plating metal and current.

What's more you turn out barrel plating quality never before equalled—avoid complaints, eliminate rejects, stripping and rerunning.

Modernize Your Plating Barrels with BELKE Rock and Roll Cylinders.

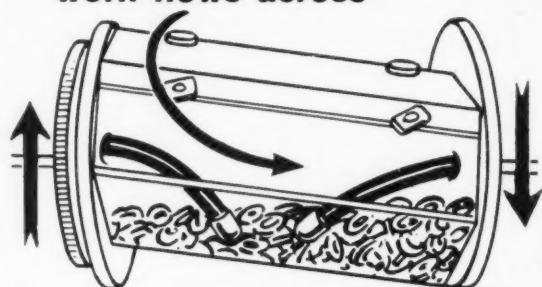
BELKE Double Oscillating Cylinders are available in all sizes from 14x36 regulars to 6x12 portables in complete plating units or to replace present cylinders.

Write or ask your BELKE SERVICE ENGINEER.

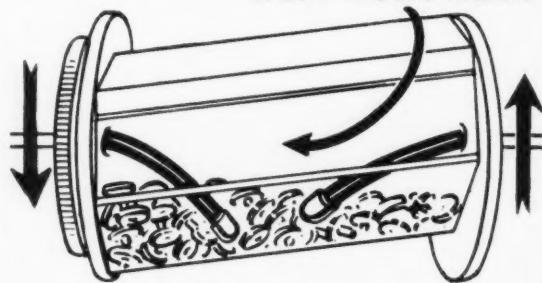
Belke Manufacturing Company
947 N. Cicero Ave., Chicago 51
EVERYTHING FOR PLATING PLANTS

Each Revolution

work flows across

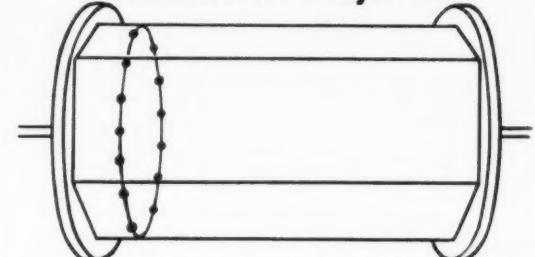


work flows back



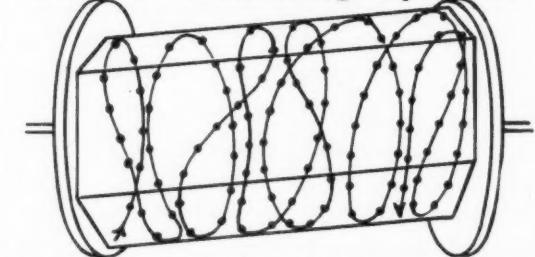
**A marked piece shows
the way the work goes !**

Conventional Cylinder



As the cylinder revolves the marked piece follows a fixed path round and round the inside wall.

Double Oscillating Cylinder



The marked piece shows the progressive figure 8 mixing action added by double oscillation. The work pours back and forth as well as round and round.

Individual pieces move from end to end of the cylinder. They roll, twist and turn. None remains buried.

All sides of every piece are uniformly exposed to plating current. That's why Double Oscillating Cylinders give you uniform plating deposit not obtainable with conventional cylinders, in less plating time and at reduced plating cost.

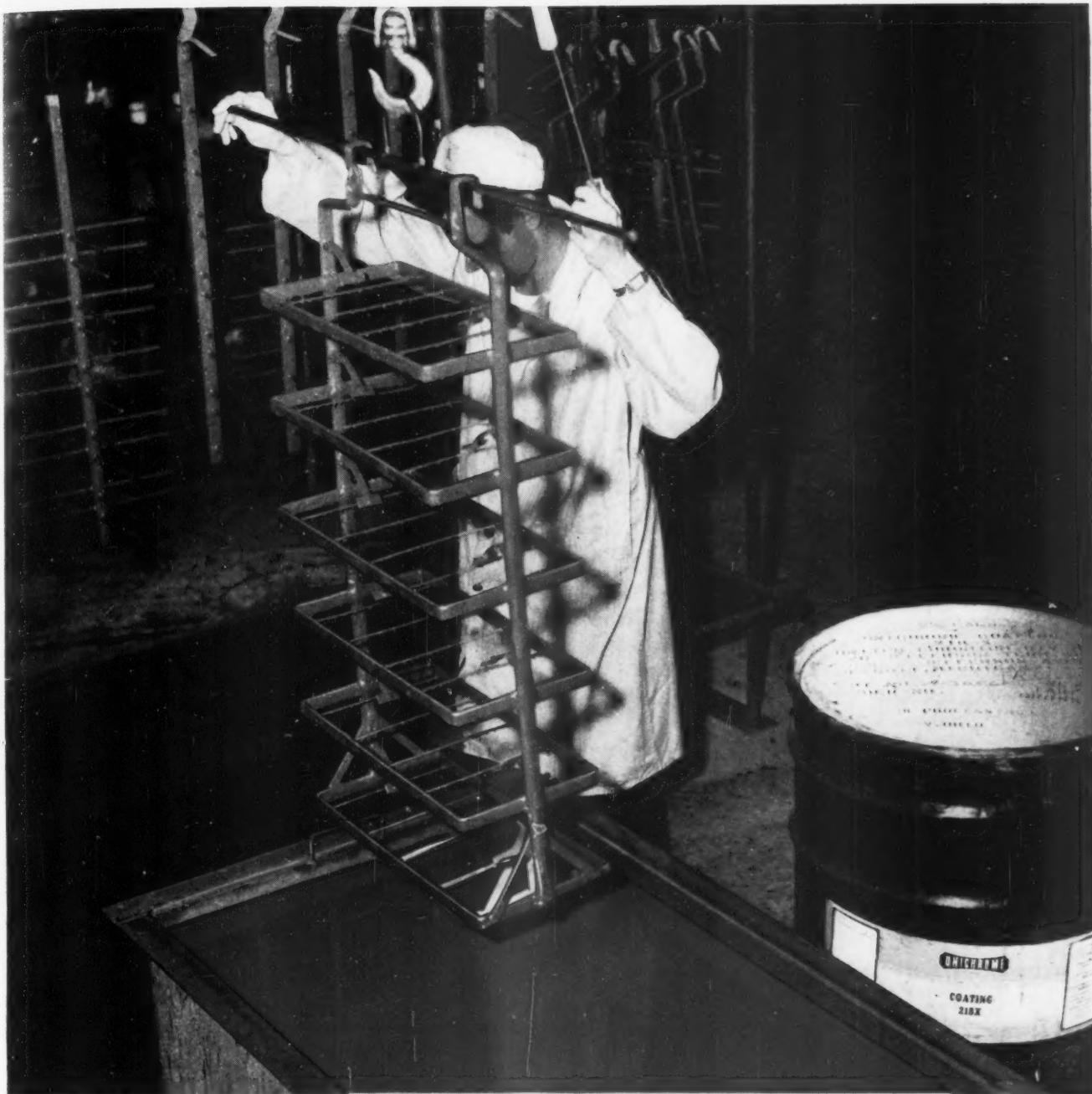


Photo Courtesy Rack Processing, Co. Dayton, Ohio

Which coating's worth looking into?

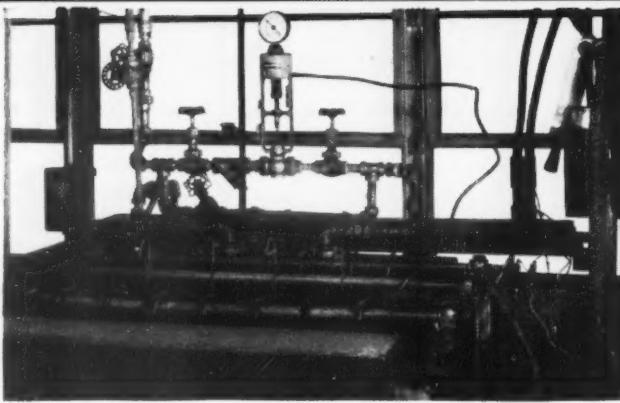
Unichrome Coating 218X, of course

NOTHING BEATS plastisol for rack insulation. Platers who really investigate, choose Coating 218X. For they find this coating backed by 10 years untroubled service experience. They see cases where coating service exceeded 6 years of daily use! No question that Coating 218X survives in *all* plating solutions, contaminates *none*. Even vapor degreasing cycles don't harm its free-rinsing slick surface. *Using the best quality at the outset saves money in the long run.*

If you'd rather have an outside firm apply Coating 218X for you, we'll name a skilled specialist nearby.

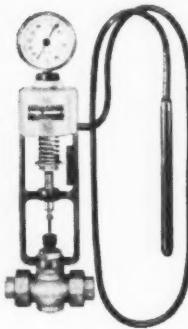
First name in plastisols for all plating purposes...





PLATERS ...

here's a sure way
to cut operating costs!
Install **AMERICAN**
TEMPERATURE
REGULATORS



Eliminate cloudy or rough deposits. Control deposit stress. Reduce rejects and consequent expensive reworking. Maintain constant color in alloy plating. Prevent breakdown of the solution. Maintain full throwing power. Stop overheating. Save steam.

All these advantages can be yours. Equip your metal finishing tanks with self-operated, automatic American Temperature Regulators. Temperatures are constantly maintained within required limits. You can be sure of continuously uniform, high-quality plating—no rejects. Where high-production conveyorized equipment is used, peak performance of the machinery is achieved.

American Temperature Regulators are available with an accurate temperature indicator as pictured here. Your men can tell immediately that required temperatures are being maintained. They can easily see and quickly reset the regulator when changing from one type of operation to another.

American Temperature Regulators are easy to select, install and maintain. No compressed air or electricity needed. Temperature adjustment and repeat setting take but a few seconds. Sizes: $\frac{1}{2}$ " to $1\frac{1}{2}$ ". Temperature Ranges: 90/180° F. or 135/225° F. standard. System: Bulb and line of temperature system are covered with solution-resistant plastic, assuring long service life. Valve: Bronze body, single seated, with renewable stainless steel seat and disc. Screwed union ends. Write for complete details.



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YOUR INDUSTRIAL SUPPLY DISTRIBUTOR is as close as your telephone. Call him for experienced counsel, money-saving service and prompt delivery from local stocks.

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... solution to a polishing problem

ELECTRO POLISH

production pieces
faster—better with

Electro-Glo

SOLUTIONS

- Polishes—Deburr—Levels
- Saves Time—Labor Costs
- Improves Product Appearance
- Sold as a Concentrate
- Used with Standard Plating Equipment

Electro-Glo electropolishing is the modern, economical finishing method in which a fractional amount of metal is removed rather than deposited as in plating. Electro-Glo comes to you as a concentrate, and you purchase the balance of the solution locally. It is used in conventional plating equipment.

Electro-Glo does a multiple job. Deburring, leveling, and polishing take place simultaneously. Any degree of brightness is easily obtained. Electro-Glo concentrates process Copper Alloys, Stainless Steel, Carbon Steel, and less common metals and alloys. The Electro-Glo process is recognized as a superior polishing method, and has an enviable record for Saving Time, Saving Labor, Increasing Production ... and NO royalties!

FREE SERVICES

Engineering service available. Sample piece electropolished by the Electro-Glo method without charge. Equipment layout and cost analysis furnished. Special methods and finishes developed. Send for full details.

Electro-Glo

CO.

1428 South Talman Avenue Chicago 8, Ill.

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your plating problems dissolve with *top dissolution*

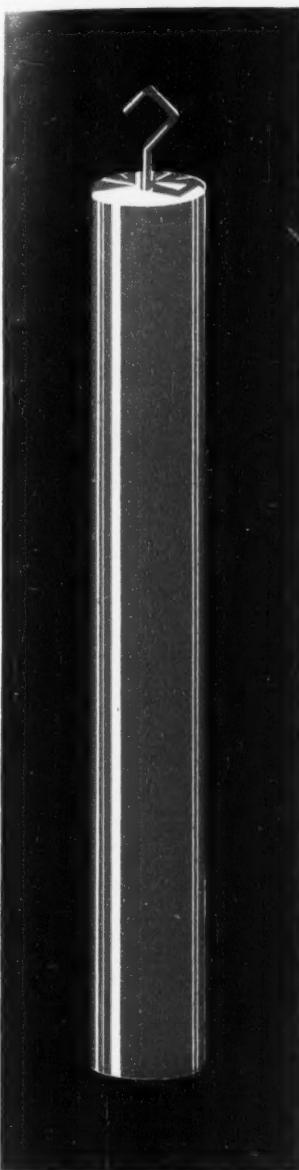
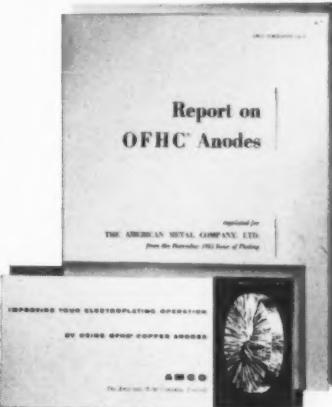
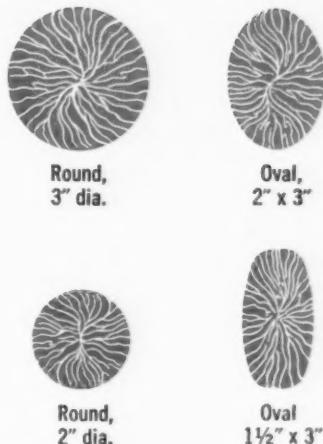
OFHC COPPER ANODES

OFHC Anodes eliminate the need for bagging . . . minimize anode particles in plating solutions . . . cut metal losses in scrap by as much as 30 percent. **The reason:** OFHC Anodes are *totally free* of oxygen and deoxidants, have high density and low porosity. These characteristics mean *fewer insolubles, uniform dissolution, top anode efficiency.*

As proved in pilot-plant tests and commercial use, OFHC Anodes yield smoother plating than anodes of any other type . . . and *with less scrap and less sludge!* **The result:** More and more plating men are turning to OFHC Anodes to end plating roughness, and to reduce losses of metal in solution build-up and scrap. . . . Four shapes available in all lengths from 18 inches to 93 inches.

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Exhaustive tests at the foremost Independent Industrial Research Laboratory in the U.S. strikingly demonstrated the superiority of OFHC Anodes. They are now proving themselves in commercial use. Find out how OFHC Anodes can solve *your* plating problems . . . send today for free copies of the Research Laboratory's *Report on OFHC Anodes* and AMCO's booklet *Improving Your Electroplating Operation*.



©OFHC—Oxygen-Free, High-Conductivity Copper



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5-2
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I wish to know more about OFHC Copper Anodes and their advantages. Please send me a free copy of:

Independent Research Laboratory's Report on OFHC Anodes
 Improving Your Electroplating Operation

MY NAME

COMPANY

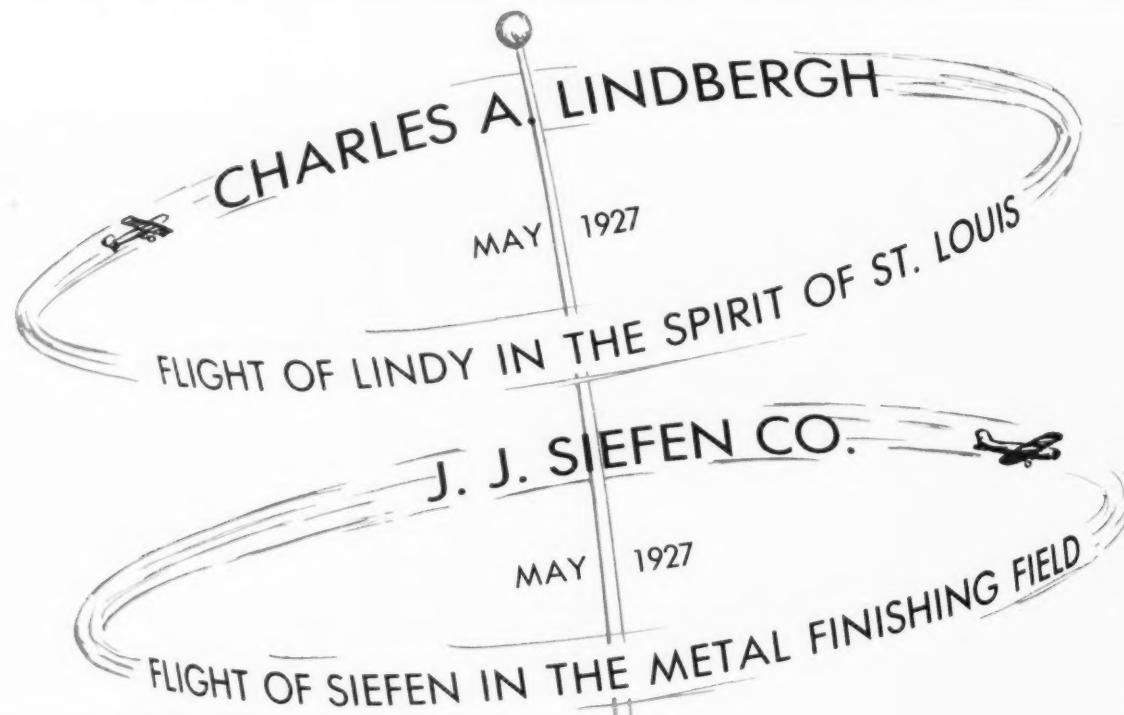
POSITION

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J. J. SIEFEN COMPANY



5657 LAUDERDALE
DETROIT 9, MICHIGAN

May 1st, 1957

CELEBRATING
our
THIRTIETH

Dear Mr. Metal Finisher,

We want to express our appreciation to you, for the confidence placed in the J.J.Siefen Company during the past thirty years.

Our growth has been due to your continued confidence in our Products and Sales Engineering.

It is our sincere desire to serve the METAL FINISHING FIELD in the years to come, as we have endeavored to since May 1st, 1927.

Sincerely yours,

J. J. SIEFEN CO.
J. E. Siefen
President.

"Siefen System" SPRAYING COMPOUNDS TO BUFFS
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Everything for Buffing and Polishing

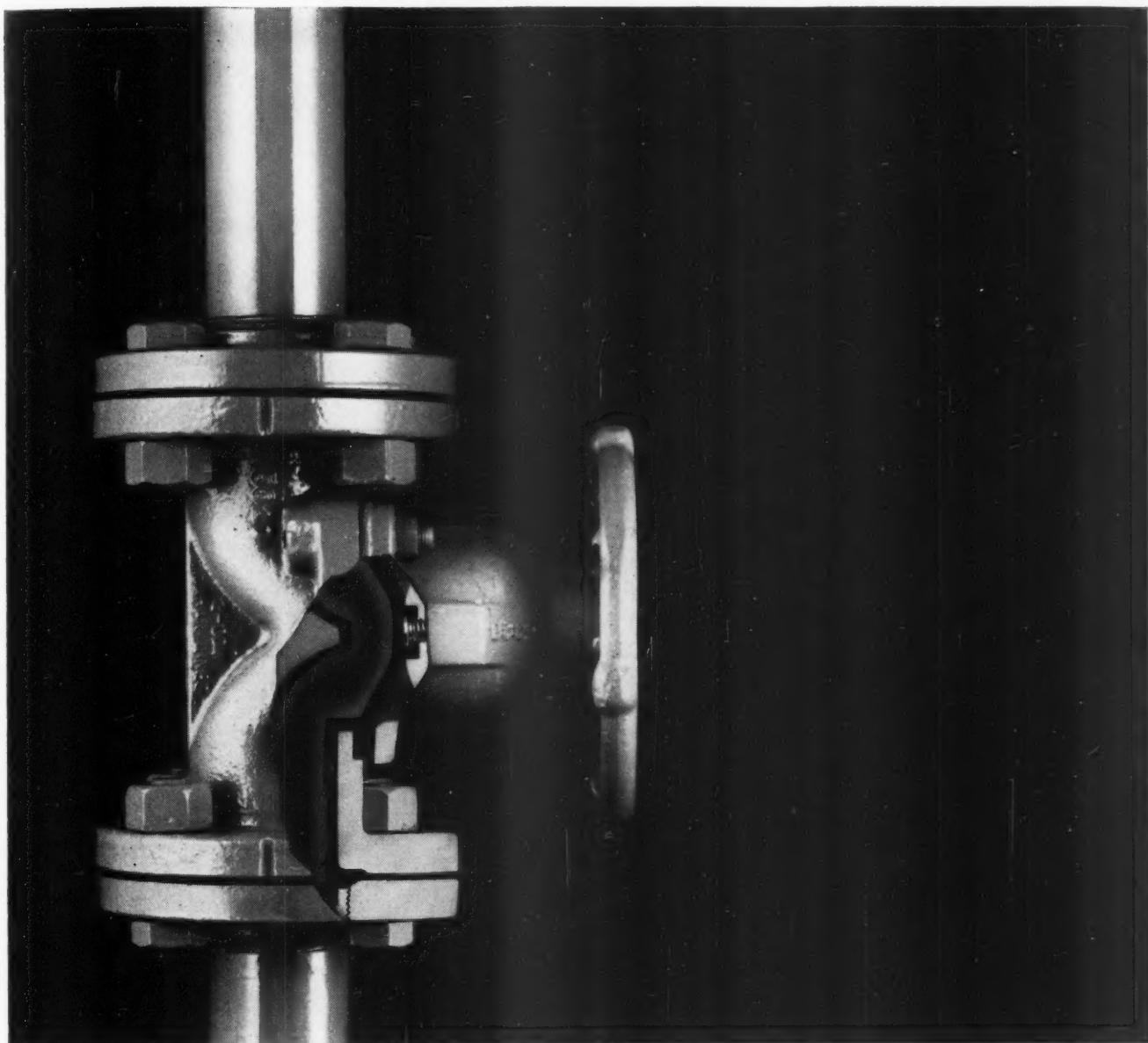
MAY 1957

AIRLINES CIRCLE THE WORLD

J. J. SIEFEN CO.

**A LEADER IN NATIONWIDE
FINISHING MATERIALS
AND SYSTEMS**

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5657 LAUDERDALE
DETROIT 9, MICH.



Corrosion protection is continuous in saran lined pipe—liquid never touches metal.

You can see why Saran lined pipe prevents corrosion

Corrosive liquids never touch the rigid steel pipe . . . it's lined with durable saran

You can stop downtime and other corrosion-caused losses by using saran lined pipe.

The saran liner, over which is swaged a steel pipe, gives complete protection from commonly used acids, alkalies and many other corrosive liquids. At no time do these liquids touch the rigid steel pipe, its fittings or valves.

You'll like the labor-saving way it fabricates. Cutting and threading can be done in the field with conventional hand

or power tools. And you can hang it in the same manner as ordinary steel pipe.

Saran lined pipe has high bursting strength, withstanding working pressures up to 300 psi. Fittings and valves are available in cast iron or malleable iron for 150 psi working pressures and in cast steel for 300 psi working pressures.

For tomorrow's protection today, investigate saran lined pipe. **THE DOW CHEMICAL COMPANY, Midland, Michigan.**

SARAN LINED PIPE COMPANY
DEPT. SP1593C
2415 BURDETTE AVENUE
FERNDALE 20, MICHIGAN

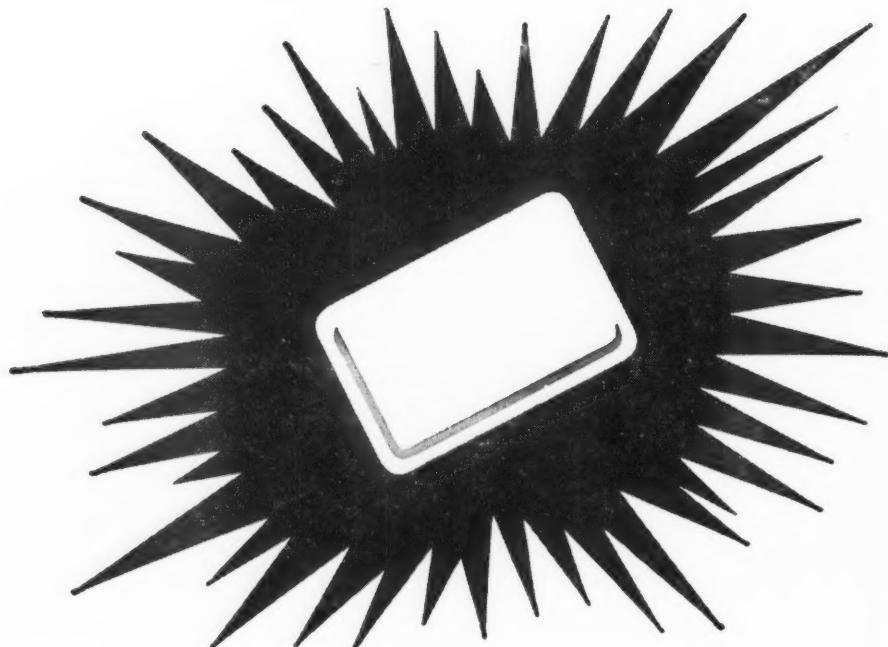
Please send me information on saran lined pipe, fittings and valves.

Name _____ Title _____ Company _____
Address _____ City _____ State _____

YOU CAN DEPEND ON



There's
Quality
Plus in



Du Pont "CYANOBRIK"

**Now you get the usual high-quality Du Pont sodium cyanide . . .
PLUS low sulfide content and a cost-of-use savings**

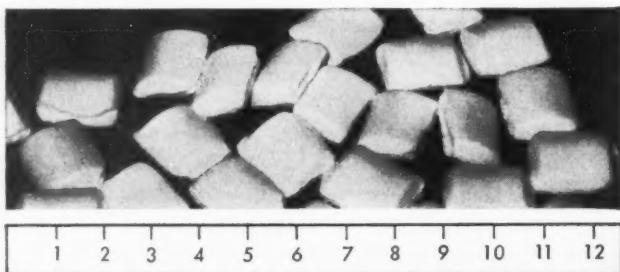
A new form of sodium cyanide from Du Pont is available to the electroplating industry. Called "Cyanobrik", the product comes in 1-oz. pillow-shaped briquettes. "Cyanobrik" sodium cyanide offers the usual high quality and excellent performance of Du Pont sodium cyanide in the plating of various metals. In addition, the new product features extremely low content of sulfur (as sulfide), 0.0005% or less by specifications.

For use in cyanide electroplating solutions . . . particularly effective in sulfide-sensitive electrolytes. "Cyanobrik" is desirable for cyanide electroplating solutions normally using sodium cyanide—including copper, zinc and cadmium. Its almost-negligible sulfide content

makes it especially attractive for use in sulfide-sensitive electrolytes such as proprietary bright copper baths, when economic considerations make the use of sodium cyanide preferable to potassium cyanide. "Cyanobrik" is not suitable for use in molten heat-treating baths, and should not be used for this purpose. "Cyanegg", "Cyanoflake" and "Cyanogram" sodium cyanides are readily available for heat-treating applications.

"Cyanobrik" is available in mixed truck loads with potassium cyanide, and from local stocks in principal cities.

E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Wilmington 98, Delaware.



ELECTROPLATING
CHEMICALS • PROCESSES • SERVICE



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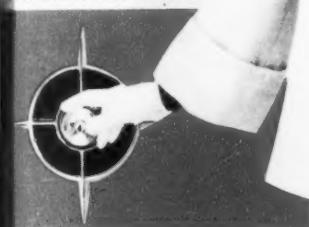
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Today's builder's hardware is designed and manufactured to appeal to the modern family's taste . . . functional but with a subtle touch of high style. The Schlage Lock Company has always been a leader in the production of locks and hardware that are as modern as tomorrow.

Finishes too can be modern combining elegance and smartness. And, today's most stylish, most practical and most modern finish is a SATIN FINISH . . . a Lea Satin Finish.

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CLIP/CONTINENTAL

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SCHLAGE...

Burring, Buffing, Polishing, Lapping, Plating and Spray Finishing . . . Manufacturers and Specialists in the Development of Production Methods, Equipment and Compositions. Manufacturers of Lea Compound and Leorok . . . Industry's quality buffing and polishing compounds for over 30 years.



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Lea Mfg. Company of England, Ltd., Buxton, England
Lea-Ronal, Inc., Main Office and Laboratory, 139-20 109th Ave., Jamaica 35, N. Y.
Manufacturing Plant: 237 East Aurora St., Waterbury 20, Conn.

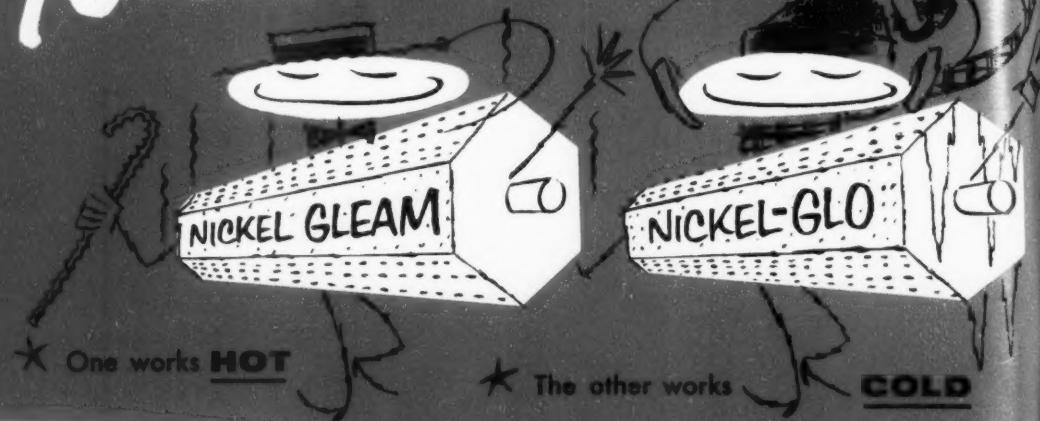
Are you interested in plating specialties?

See the other side
of this insert





"the Nickel Twins"



L-R NICKEL GLEAM

(for high temperature operation)

- ★ Rapid deposition
- ★ Exceptional brilliance
- ★ Excellent chrome coverage
- ★ High tolerance to metallic impurities
- ★ Outstanding ductility

L-R NICKEL-GLO

(for room temperature operation)

- ★ Normal deposition rate
- ★ Attractive lustre
- ★ Single addition agent, no organics
- ★ All the NICKEL-GLO plates out
- ★ Non-critical operation; minimum control

Are you barrel plating? Getting the brightness you want? The ductility? Good subsequent chrome coverage? Our research department has developed two 'effective' brighteners for BARREL nickel plating, each with distinctive characteristics:

The hundreds that are using Lea-Ronal Plating Processes know and appreciate the high standards that have been set by L-R. These two Brighteners . . . NICKEL GLEAM and NICKEL-GLO . . . offer the same high quality and effectiveness. Why not send for a trial sample of either or both? Make your own comparison. You'll find the results good.



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Plating Polishing Buffing
Burring

Are you interested in Buffing, Polishing and Burring Specialties? SEE THE OTHER SIDE OF THIS INSERT

Low-Cost Walker Rectifiers Can Solve your Electroplating and Anodizing Problems

- **Walker Work-Saver Feature**
- **No Moving Parts**
- **Dependable**
- **Efficient**

With the quality-made Walker Rectifier — Silicon, Germanium, Selenium — you get the rectifier that's built for long years of trouble-free life. And, the Walker Work-Saver feature automatically cuts current back to a pre-determined level whenever necessary to prevent work spoilage.

Engineered to deliver maximum service at minimum cost, Walker Rectifiers have a power factor of 97% and a D.C. ripple of about 4%.

Quality-made Walker Rectifiers are designed and manufactured to the highest standards. With no moving parts, there's nothing to wear out, nothing to get out of adjustment.



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MODERN EQUIPMENT FOR THE AGE OF AUTOMATION AT ANCIENT PRICES

1—Udylite Cyanide Hydraulic Full Automatic 34' long, 6' wide, *NEW 1949*, 30" lift cycle of operation:

- A. Cleaner 71" x 26" x 42" deep
- B. Rinse 35" x 26" x 42"
- C. Acid 53" x 26" x 42" (lined)
- D. Rinse 35" x 26" x 42" (lined)
- E. Plate (unlined) 14' going 18' on return
- F. Rinse 35" x 26" x 42"
- G. Hot Rinse 55" x 26" x 42" (lined)
- H. Dryer 6' long

This unit can be adapted for nickel, nickel and brass, nickel and chrome, or a Bright Dip cycle can be readily installed for cadmium or zinc.

1—Hammond OD—9B Tube Polisher.

1—Acme type SM Buffing Machine.

1—Acme Reveal Moulding Machine.

1—Like new Roto Finish Machine, Variable Speed, Rubber-Lined, 2 compartment, each compartment 22" x 35".

1—Hanson-Van Winkle-Munning Synchronous Motor Generator Set, rated 7500/3750 amperes at 9/18 Volts, 360 R.P.M. 40 Degree, Synchronous 125 HP 220/440, 3 phase, 60 cycle motor, serial #12362, 1952 *vintage*, full control and starting equipment.

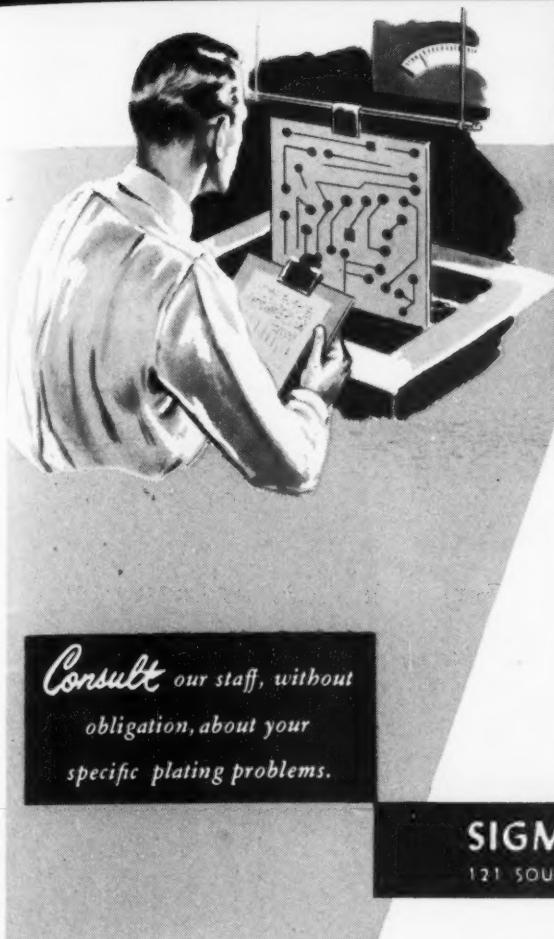
1—Chandeysson Synchronous Motor Generator set, rated 5000/2500 amperes at 7/14 Volts 360 R.P.M. 25 Degree, synchronous 60 hp 220/440 3 phase, 60 cycle motor, serial #28132 1940 *Vintage*, full controls and starting equipment.

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Specialists in the Unusual

*Consult our staff, without
obligation, about your
specific plating problems.*

Technological knowledge acquired through many years of experience, plus special processes and equipment, assure the high quality of our Rhodium Plating Solutions.

Recommended for contact surfaces of switches, wave-guide parts and other electrical applications, such as printed circuits...Can be applied in extremely heavy deposits, up to 100 milligrams per square inch.

Rhodium plating provides the advantages of whiteness, lustre and corrosion resistance of a precious metal.



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**FOR QUALITY CONTROL
THE MOST COMPACT PLANT
AT LOWEST INSTALLED COST**



**CUSTOM
PACKAGED PLATERS**

Whenever your work demands a high degree of quality and uniformity — that's when you should get all the facts on Daniels Custom Packaged Platers. Each of these completely self-contained plating plants is designed to meet your specific production needs. Daniels Custom Packed Platers have found wide acceptance in the electronics and jewelry industries, where precise quality control is a major objective. Also, you'll make these three important savings: Compactness (small floor area), low installed cost, speed of operation without sacrificing uniformity.

FREE: Write today on your letterhead for illustrated booklet describing both Daniels standard plating barrels and Custom Packaged Platers.

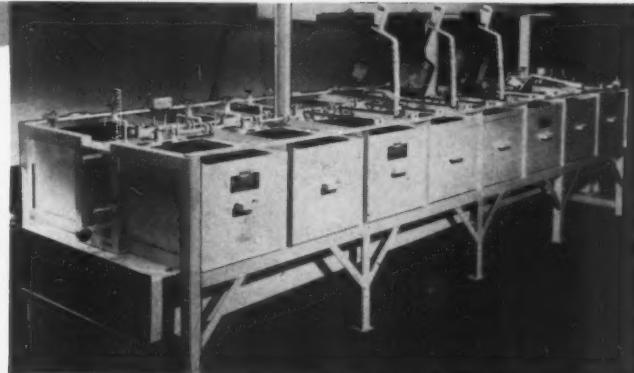
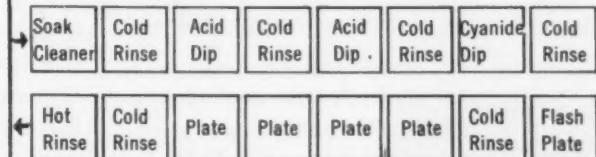


Photo shows typical Daniels Packaged Plater and plating cycle. Any sequence of operations is adaptable to their versatile units.

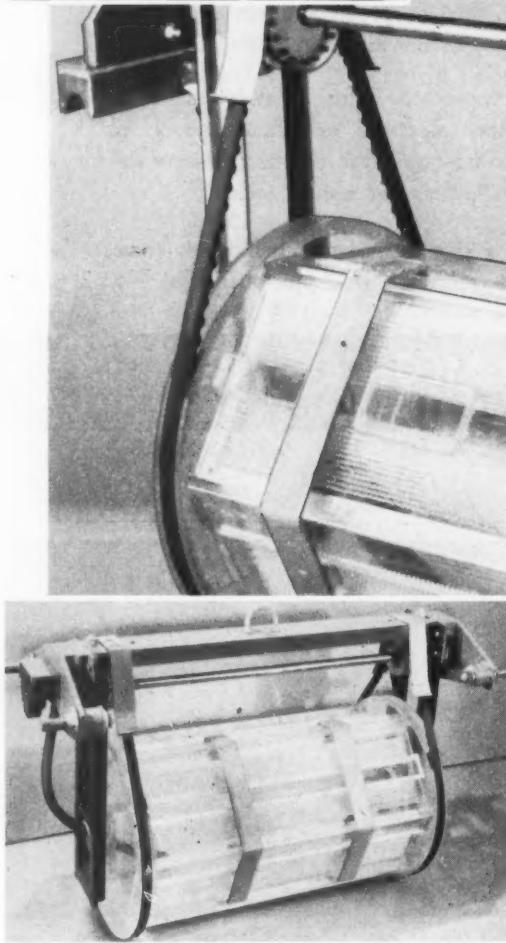
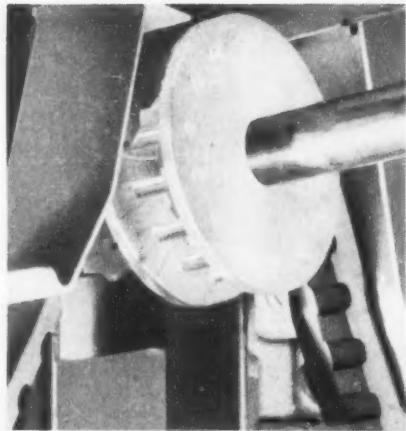


41 Years of Dependable Service

**DANIELS PLATING BARREL
& SUPPLY CO.**

129 Oliver Street, Newark 5, N. J.
MArket 3-7450





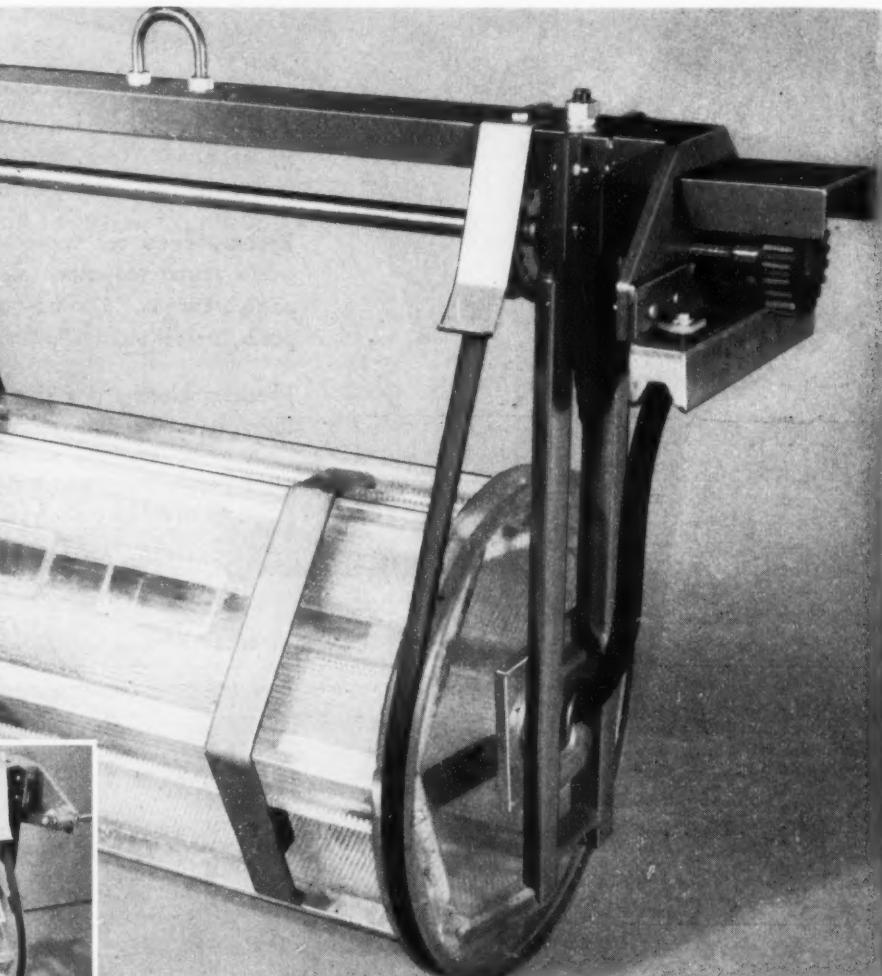
There's a G-S "Cogged-V-Belt" Drive Cylinder and Superstructure to fit Your Tanks and Drives. Boost the earning power of your plant with these G-S features. **Faster, better plating** with positive G-S "Cogged-V-Belt" power transmission. **Less Maintenance** boosts efficiency, cuts down-time. **Floating End Plates** for automatic positioning. **Four-point (horn) Contacts** — three-point suspension. **Heavier Dangler Cables**, longer life. **Floating Hubs**, faster cleaning, danglers won't "ride-up." **Adjustable Bearings** for constant drive. **All-Welded Cylinders**, H-T Sincolite or Tempron, most rugged, heavy-ribbed construction. **Total Cylinder Immersion**, bigger loads, eliminates explosion danger.

Perfected: all the new features!

Patented: U.S. Pat. 2,562,084 and others!

Proved: in hundreds of plating plants . . .

FOR YOUR PRODUCTION!



G-S "Cogged-V-Belt" Drive Plating Barrel "Out-Performs Them All" say platers.

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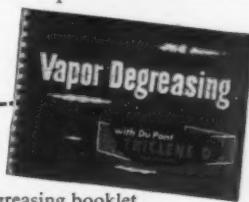
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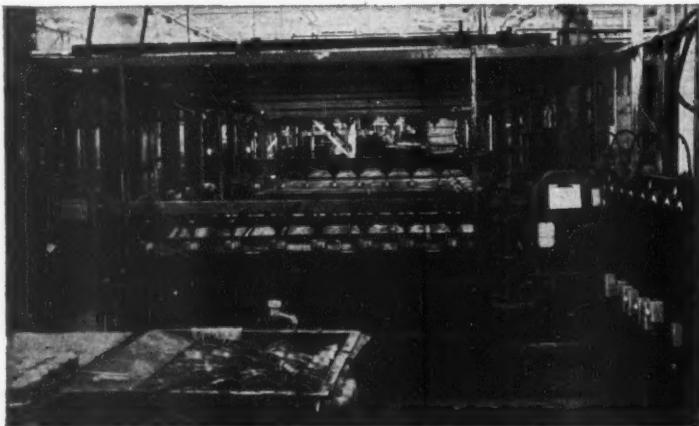
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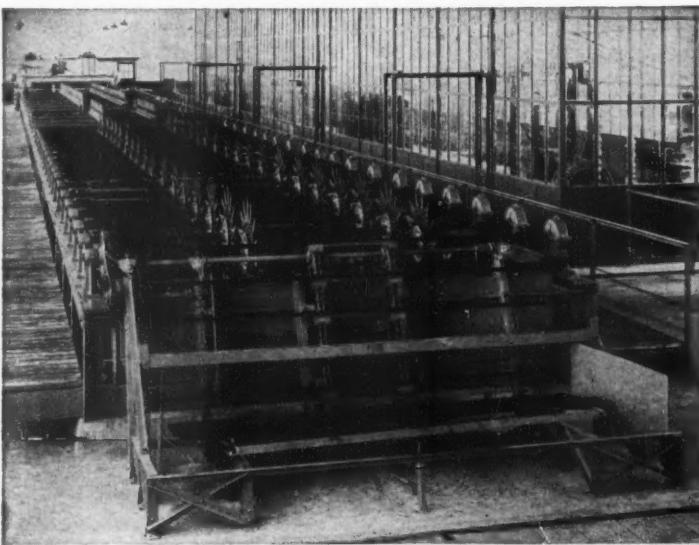
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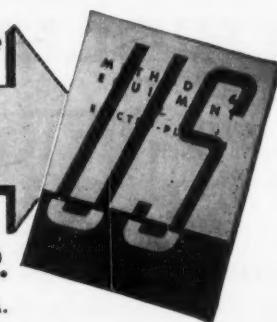
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DEVOTED EXCLUSIVELY TO METALLIC SURFACE TREATMENTS

MAY, 1957

Volume 55 Number 5

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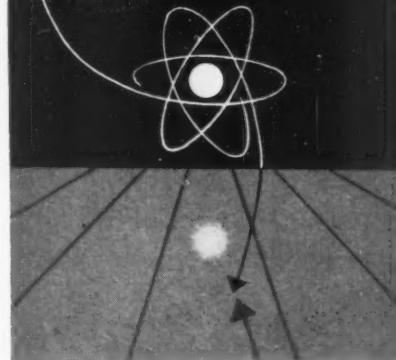
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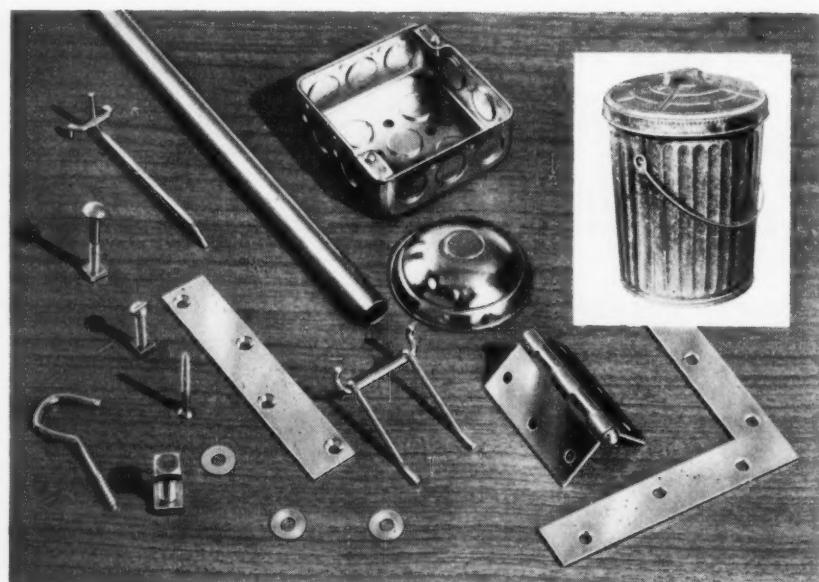
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Selecting Supervisors

Part of an editor's job is to separate for his readers, from all the literary chaff which continually arrives at his desk, the relatively minute amount of digestible wheat. In the performance of this dreary task, he sometimes discovers an item which, at first glance, doesn't appear to be of any value but, on further examination, makes him feel that his efforts, for a change, have been well rewarded. Such was a little booklet with the above title, which the Government Printing Office recently placed on sale.

As an aid to management, the information presented is of unquestionable value. However, this alone would not have led us to comment on it. What struck us most forcefully was that the factors which will influence the employer in his selection of an applicant are of obvious importance also to the applicant himself, in learning how to put his best foot forward. Reams of copy have explained to hopeful job aspirants the desirability of wearing, for the interview, a conservative tie, a clean shirt and a freshly pressed suit, which is always a good idea, especially if one has no other qualifications to offer. However, the metal finisher has to establish his competence for the job in more specific ways.

We have often emphasized that technical competence is overshadowed, in many cases, by the need for supervisory ability in modern industry. How much of a selling point is thirty years' experience operating every type of plating solution and maintaining them by chemical analysis, to an employer who has a large zinc plating department and wants to know if the applicant can handle a crew of tank men, rackers, inspectors, and packers, many of them on an incentive system? Can he efficiently schedule production, keep required records, give clear instructions? Can he promote morale?

In this booklet, the supervisor will find, for an investment of only twenty-five cents, all the criteria which define the qualified man. He can then analyze his own qualifications, compare them to learn where he is weak, and take the proper steps to improve himself in these respects. He will know what the employer wants and will be able to effectively present his own case. As the authors aptly put it, "We have left behind the stage where it was assumed that all the supervisor needed was technical competence and have also gone beyond the point at which the earlier approach was deemed completely in error and total emphasis placed on human relations ability. We now know that for many jobs the supervisor has to be a specialist in human relations and a technical expert as well."



Barrel Finishing - How and When to Use It

By Lester F. Spencer, Consultant, West Allis, Wis.

FINISHING operations on fabricated metal component parts embrace a wide variety of procedures; barrel finishing being a division within this group. However, a characteristic that is common to a large majority of operations within this group is that they are expensive and time consuming. This is due to the relatively large amount of manual labor that is required for the removal of edge roughness, burrs, excess metal and various types of surface irregularities. One logical approach to this problem is to handle the work in bulk rather than on an individual basis and, on this basis, barrel technique has always been an attractive finishing procedure since it lends itself readily to bulk loading. In addition, due to the recent advancements that have been made in this field, the application has been extended to component parts that range from small symmetrical shapes to relatively large parts that are of complicated design.

Barrel finishing of metal parts in the present industrial world has taken tremendous strides as compared to procedures that have been used in years past; these advancements being achieved through the media of research, experimentation, and application of equipment design, finishing materials, and procedures.

Photos courtesy Almco Div., Queen Stove Works, Inc.

Where full advantage is taken of modern barrel finishing technique, impressive cost reductions, increased productivity and improved product is usually realized regardless whether the manufacturer be large or small. The table indicates examples where cost reductions have been realized. A large variety of parts, involving metal stampings, die cast components, machined parts and even assemblies can be processed to rigid specifications.

Barrel finishing operations can be effectively used in the roughest form for the removal of sand, "skin," and fins from castings, and scale from forgings; this process frequently being referred to as barrel tumbling when using the accepted terminology. A more controlled operation, which is usually termed rolling and may be separated into sub-divisions according to the specific operation, may be used in the removal of flash and burrs, wire edges, pits, scale and rust accumulations, rough spots; or, stock removal to obtain a uniform surface condition. Thus, the term "deburring" is used where the intended purpose is the removal of burrs and light flash projections; "cutting" or "cutting down" is the term used for operations where surface improvement of surface is the intended purpose; and, "burnishing" refers to an operation where there is very little metal removal; however, the parts obtain a high luster finish.

Examples of Cost Reduction by the Use of Barrel Finishing³

Part Type	Previous Method Used	Cost Per Piece Previous Method	Cost Per Piece Barrel Method	Cost Saving %
Zinc Die Cast Parts; Business Machines	Wheel Deburring	\$ 0.018	\$ 0.00017	99.1
Brass Trim; Plumbing Fixtures	Polishing Lathes	0.0204	0.00109	94.7
Bronze Bearing Wear Plates	Sand Paper	0.0831	0.0323	61.1
Gears	Hand Filing	0.398	0.0635	84.0
Portable Electric Tools, Parts	Belt Grinding	0.0453	0.0024	94.7
Roller Bearing Parts	Hand Filing	0.40	0.03	92.5
Aluminum & Zinc Die Castings	Filing	0.00315	0.00013	95.9
Screw Machine Parts	Belt Sanding	0.00435	0.00011	97.4
Fine Pitch Gears	Wire Brush	0.01	0.0002	98.0
Stainless Steel Parts; Aircraft	Wire Brush	0.06	0.01	83.3
	Bench Grinder			
Hardware	Buffing	0.023	0.0017	92.6
Medical Instruments	Hand Polishing	0.0425	0.0005	98.8
Scales & Food Machines	Belt Grinding	0.0045	0.000075	98.3
Component Parts; Dairy	Belt Sanding	0.0137	0.0021	84.7
Instrument Parts, Aircraft	Hand Filing	0.08	0.01	87.5
Shoe Repair Machine Parts	Grinding Wheel	0.049	0.0093	81.0
Oil Burner Parts	Buffing	1.80	0.90	50.0



Fig. 1. Improvement in surface finish of cast parts.³

In the event that rigid standards as to finish or contour are required, as is exemplified by many component parts used in the aircraft industry, a precision barrel finishing method will effectively blend in chamfers and form radii, or will round off corners or sharp edges to any pre-determined value. In addition, considerable surface finish improvement accompanied by excellent color is obtained with respect to micro-inch finish; an operation such as this will permit the production of parts of from three to seven micro-inch surfaces and, when specified, a tolerance limit of plus or minus 0.0002" can be obtained on radii.

There are a number of reports in the literature which cite the advantages of precision barrel finishing technique for the production of close tolerance work. Gray² has given three examples where this method is used for the finishing of component parts for automatic transmissions. In a specific instance, deburring operations are conducted on both precision machined parts and stampings where it was essential to have sharp edges and machine surfaces unaffected. One manufacturer, according to Anderson,⁵ uses precision barrel finishing for several hundred different designs, totaling more than a million parts per week; the materials being zinc, aluminum, and magnesium castings,

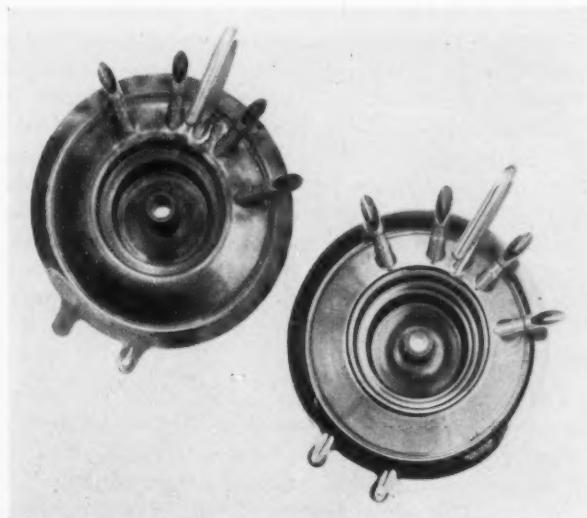


Fig. 2. Braze assembly which has been barrel finished.

along with a large variety of wrought steels. The weight of these parts range from one ounce to as much as 15 pounds for individual parts, whereas, the dimensional range is from a fraction of an inch to as much as 24 inches. The parts processed ultimately go into carburetors, brakes, aircraft components and other products. Typical "before and after" illustrations on barrel finished parts are given in Figs. 1 to 3. Notice that the item illustrated in Fig. 2 is a braze assembly.

Of particular interest is the hardened gear that is illustrated in Fig. 3; the parts being tumbled to remove both scale and burrs and also to form a 0.015" radius. The details of finishing, as given by Gray are as follows: (a) horizontal, octagonal type, lined barrels were used; the size of each compartment being 28 inches in length and 30 inches in diameter; (b) aluminum oxide tumbling abrasive was used; the roughing operation required 600 lbs. #2-T and 300 lbs. of #8-T per compartment, whereas, the finishing operation required 800 lbs. of #14-T abrasive; (c) in roughing, the water level was about 3 inches below

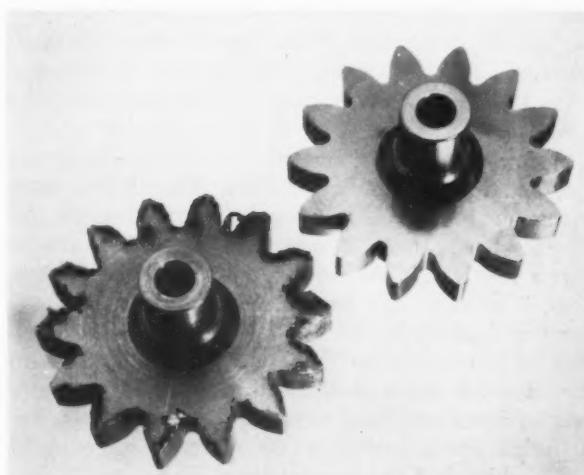


Fig. 3. Hardened gear tumbled to remove scale and to form 0.015" radius.

the charge, a 12 r.p.m. barrel speed was used, the time was one hour and an acid type soluble cleaner was used; and, (d) in finishing, the water level was maintained 10 inches above the charge, an 8 r.p.m. barrel was used, the time was 15 minutes and 2 lbs. of a suitable cleaner were used.

Variables to be Considered

In any discussion of barrel finishing, consideration of those variables which have an influence on this method is invaluable. Thus, as in other industrial processes, a knowledge on the influence of these variables on the quality and efficiency factors, as well as methods developed to control these variables, will permit both dependability and reproducibility. For the purpose of this discussion, the variables under consideration can be divided into two groups, the first dealing with the physical aspect of materials and equipment while the second group includes those variables which are under control of the operator. In the first category, which can be termed "parts" variables, the following factors should be considered:

- (1) the size and shape of the part along with due

consideration of recesses, angles, slots, holes, intricate contours, and blind holes. This factor will influence the selection of the abrasive grain size which will reach all areas without wedging of the grain into the work,

(2) the material type which would include both the hardness of the component parts and the base composition, i.e., whether it be zinc, copper, aluminum, magnesium, steel, etc. This factor will determine to some extent the procedure applicable, the selection of both the cleaner and abrasive type, and the barrel speed,

(3) the size and location of the burrs or protrusions; this serving as a base in determining the time required for removal,

(4) the finish that is specified in the blueprint; this will guide the operator in the selection of the abrasive grain size, the cleaner type and the barrel speed,

(5) the production requirements which may influence the equipment type, the procedure for economical and quality production and, to some extent, the permissible work load. This latter factor is usually determined by experimentation for each part design.

(6) the equipment available for performance of a given job.

A few additional comments may be made on the size and location of burrs. Thus, normal and easily accessible burrs can be removed regardless whether they are hard or soft. However, it is generally conceded that a relatively hard burr, due to its inherent brittleness, is more readily removed. An interesting experiment in determining the relationship between the location of burrs and the time required for removal by the abrasive action realized during barrel finishing can be described. Steel strips, approximately 4 inches in length and 1 inch in width, were cut on a punch press which left the normal burr. These strips were then divided into three groups, one group which remained flat, the second group which had two 90 degree bends to form a "U" shaped section, and the third group which had four 90 degree bends to form a "C" shaped section. Each group was barrel finished under identical conditions; the results obtained indicated that: (a) the flat shaped parts were completely free from burrs in 45 minutes; (b) the "U" shaped parts required a two hour cycle for the removal of burrs; and, (c) the "C" shaped parts, where the burrs were more inaccessible, required eight hours before they were completely free from burrs. It should be remembered that barrel finishing techniques will not replace rough grinding operations in the removal of extra heavy burrs, or burrs in concealed or hard-to-reach places.

The controllable variables, which would include speed of rotation of the barrel, height of the work load, volume of water, processing time, and both abrasive and cleaner type, would be dependent upon the type of part, its size and configuration, and the production requirements.

However, before variables are considered in detail, let us consider the mechanical action that is realized during rotation of the barrel; the controlled abrasion being obtained by a sliding action of the

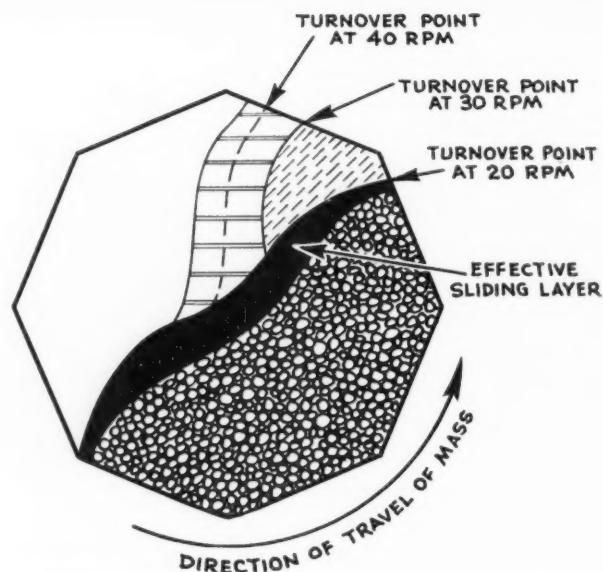


Fig. 4. Relationship of turnover point to barrel speed.³

mass within the barrel. Thus, the principal of abrasion as defined by Webster's dictionary is "to rub off or wear away." To explain this action in barrel finishing, the mechanical action is obtained by this previously mentioned sliding action inside the barrel, during which the weight of the mass, or work load, in conjunction with the properties of both the abrasive chips and finishing compounds, produces an abrading action which removes superfluous metal from the parts. As this action continues, there is a gradual wearing away of the unevenness of the metal's skin until the desired micro-inch surface, or the desired radii, is obtained.

The work load continually moves upward as the work rotates, up to a turnover point where the effect of gravity overcomes the tendency of the mass to stick together, so that the top layer slides, rather than falls, toward the lower part of the barrel. Although some abrading action occurs as the work load rises, it is estimated that 90 per cent of the grinding, deburring, or burnishing action occurs during the slide. Because the parts and the media are freely moving within the barrel, the same amount of finishing action will occur on each part during any given period of time. It should be realized that the surface condition of the media and the shape of the work will also have a major bearing as to the amount of abrading action within the barrel. Thus, in an operation such as tumbling and rolling, the abrasive selected will realize efficient metal removal in proportion to its physical configuration and the retention of this configuration during the cycle. In ball burnishing, due to the smoothness of surface of the medium, metal removal will be at a minimum; however, the abrading material will perform a peening action to smooth out minute surface irregularities and also provide a luster to the processed parts.

Early experimentation in barrel finishing determined several constants which applied to all barrel finishing procedures. These constants included speed of rotation of the barrel and the height of the work load in relation to the amount of deburring and finishing action which occurred. The end view of a 30

inch barrel is given in Fig. 4 indicates that when the barrel speed, or r.p.m., is increased, the turnover point of the mass also increases. High speeds raise turnover points too high, causing parts to drop rather than slide; this often resulting in damage to the parts, such as nicking, or part-on-part impingement. The correct speed, which frequently is determined by experimentation for a specific set of conditions, is that which produces the longest slide possible to obtain the desired results in the shortest time cycle and, therefore, the highest production rate. Barrel equipment is usually provided with variable speed drives ranging from 6 to 30 r.p.m., Anderson employing a speed range of from 12 to 21 r.p.m. with the slower speeds used on the larger diameter barrels.

The usual recommendation given as to work load, which is the combined load of parts and medium, is approximately 50 to 60 per cent to realize the most effective abrading action. This range of values, which may vary as indicated due to the influence of other variables, will permit the longest slide and, thus, obtain the maximum effective abrading action without producing damage to the parts processed. Of interest is a test program that has been reported on the determination of the relationship between work load and the efficiency obtained in a deburring action. In six tests that were performed, the same number of unhardened steel parts were processed in an identical manner, with the exception that the load height, or capacity, was varied from 20 to 75 per cent; the increase was obtained by the addition of abrasive chips. Each load completed a four hour cycle and the radii of four exposed edges were measured; these radii measurements were taken before and after the processing and the difference indicating the amount of abrading action that had taken place. The results of these tests were: (a) the 20 per cent load height indicated a loss of 0.0083"; (b) the 30 per cent load height showed a difference of 0.0088"; (d) the 50 per cent load height showed a difference of 0.0092"; (e) the load height of 60 per cent showed a difference of 0.0081"; and, (f) the 75 per cent load height showed a value of 0.0073". On the basis of these results, the conclusion was that the 50 per cent load height is

optimum under the specific conditions of the test program.

The cutting action obtained in the wet process of barrel finishing is influenced by the amount of water that is present within the barrel load. Normally, where maximum cutting action is desired, the amount of water should be sufficient to form a paste of medium to heavy consistency.⁶ Other recommendations³ are that the water level be about 3 or 4 inches below the mass of the parts and media. If too dry, the abrasive may stick to and coat the work material and interior of the barrel and thus prevent the desired action. On the other hand, increasing the water level would tend to slow the cutting action; however, the finish would be finer than that produced with less water.

The processing time will depend upon the results desired and the influence of those factors of shape, size, weight, contour, hardness, and type of material to be barrel finished. Thus, brass and bronze castings may require 10 to 15 hours processing time; malleable iron castings from 30 to 40 hours; and, for gray iron castings, from 70 to 80 hours. Anderson found a time cycle of from 20 minutes to 2 hours for deburring zinc, aluminum, and magnesium castings, and a time cycle varying from 1 to 12 hours for wrought steel. For stamping and automatic screw machine parts, it has been stated⁶ that the variation in time may be broad; the limits being from 1 to 100 hours depending upon the quality of the stock and the extent of die marks, scoring, and rough edges obtained during the machining operation. Usually, when an operation such as deburring is performed, it may be necessary for the cycle to be interrupted from time to time to permit observation of the progress that has been made.

One of the more important variables in barrel finishing is the abrasive medium, along with the optimum amount required for the specific operation and the size of the abrasive particles. In the early days of barrel finishing very little thought was given to the importance of this variable. Frequently, the rough work pieces were placed in the barrel with almost anything that was handy, broken grinding wheels, cast iron slugs, or broken stones; the mass being rotated until the part felt smooth to the touch. Peening over of sharp edges rather than removal of metal often resulted, while the control of dimensions was virtually unattainable.

The abrasive types that may be employed would include the natural media such as sand, pumice, quartz, flint sea sand, agate, granite, and limestone; the manufactured media such as silicon carbide and aluminum oxide; and, the metallic media such as highly polished and case hardened steel balls. The effectiveness of the abrasive is dependent upon particle size, hardness, and sharpness; the choice being made on the basis of maximum cutting efficiency, deburring action, etc., which will mean minimum rolling time. As to application, an abrasive such as pumice is sharp but relatively light and soft, which makes it applicable for brass and soft metals. Emery, aluminum oxide and silicon carbide, on the other hand, which are extremely hard, are resistant to fracture, and have excellent cutting ability, would be the

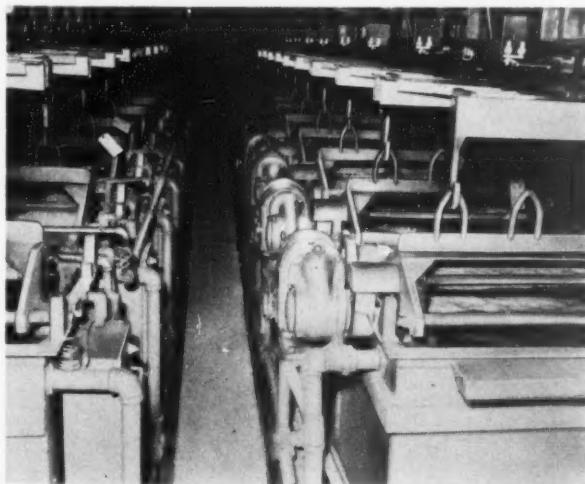


Fig. 5. An "in line" system for submerged finishing.

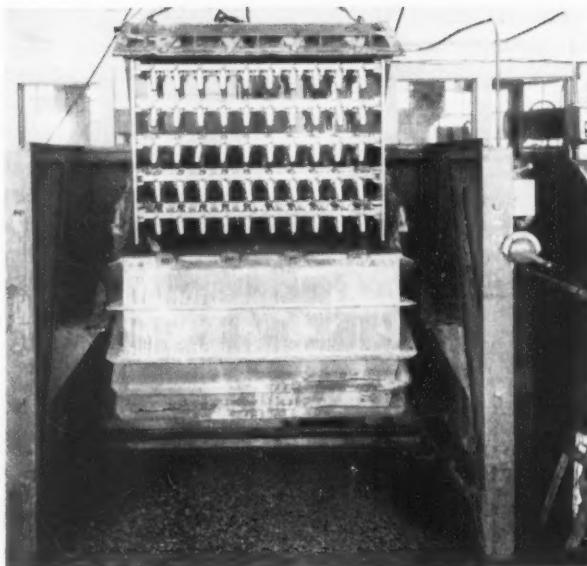


Fig. 6. Fixture for 100 electric drill gun housings.

preferred abrasives for rapid cutting of the hard metals. A point to remember on the cutting ability of a media is that this factor is controlled by the maintenance of a sharp cutting surface of the abrasive during barrel finishing rather than the initial hardness of the material. An example of this fact is the inability of steel balls, which have a relatively high hardness since they are case hardened, to effect any cutting action even on the softer materials such as zinc, aluminum, and magnesium. On the other hand, limestone, which is relatively soft but retains a surface condition amendable to a cutting operation, will remove comparatively hard metals.

Natural minerals, which include sand, agate, quartz, flint and granite, have been used to a large extent as an abrasive medium since prior to World War II. Sand, agate, quartz, and flint are chemically inert, which permits their use with either alkaline or acid type compounds; these minerals being quite hard, exhibiting a value of about seven on the Moh's scale. The hardness of granite will vary in accordance with its composition; however, it has served satisfactorily as a cutting medium upon proper selection. The size chosen is usually that capable of cutting rapidly, sufficiently large to prevent lodging in holes or recesses, and yet small enough to reach all edges to be burred. Limestone is also used to a considerable extent; however, it has one disadvantage in that it reacts with acids and affects soap-base compounds. Due to the rapid break-down of the material during barrel operation, it is used for light cutting and coloring operations.

The synthetic medium, aluminum oxide, is characteristically hard, strong and tough; its relatively high weight of 125 lbs. per cubic foot provides the effective pressure of the abrasive on the work. This combined pressure and cutting quality will assure fast cutting action. Aluminum oxide is available in processed form in ten different grit sizes ranging from $1\frac{1}{2}$ to 2 inches (#00-T) to approximately $\frac{3}{2}$ inches (#12-T). The coarser sizes (#00-T to #3-T) are usually employed in rapid deburring, the removal of flash, heat treat scale or tool marks, the forming of radii, and for

surface finishing. Grit sizes 4-T and finer are used for processing relatively small parts and for the improvement of fine surface finishes. They are sometimes mixed with a larger grit size to reach otherwise inaccessible area. In the forming of radii, it should be remembered that the coarser grit will cut faster and will produce the larger radii and, consequently, radii of decreasing dimensions require the finer grits.

An advantage in the use of aluminum oxide as an abrasive medium is the retention of the sharp cutting edges which result in a relatively longer life than that experienced with other natural mineral media. However, if this compound is used for burnishing operations, it may become loaded; this being remedied⁴ and restored to original sharpness with a 3 minute run with a small amount of the proper detergent at high water level. Bonded shapes are also available and are used in applications where wedging is a problem or where extremely fast cutting is desired. This latter effect is due to the flat surfaces which permit almost twice as high a cutting rate as that obtained with fused chips; however, faster breakdown is also realized. In addition, these shapes cannot be used with satisfaction for coloring and burnishing, since they usually produce a matte finish.

Hard, bright steel balls have been used for years in an operation termed burnishing; the operation varying from 15 minutes to 3 hours. The use of various steel shapes is also employed to assure burnishing action in various recesses. Burnishing, which normally has no cutting or abrading action, will develop a high luster finish which is frequently suitable for a base for electroplating. However, an essential pre-requisite is that the balls be in perfect condition; thus, pitted balls will deteriorate rapidly, and balls, even with fine fire cracks, may break under the pressures generated

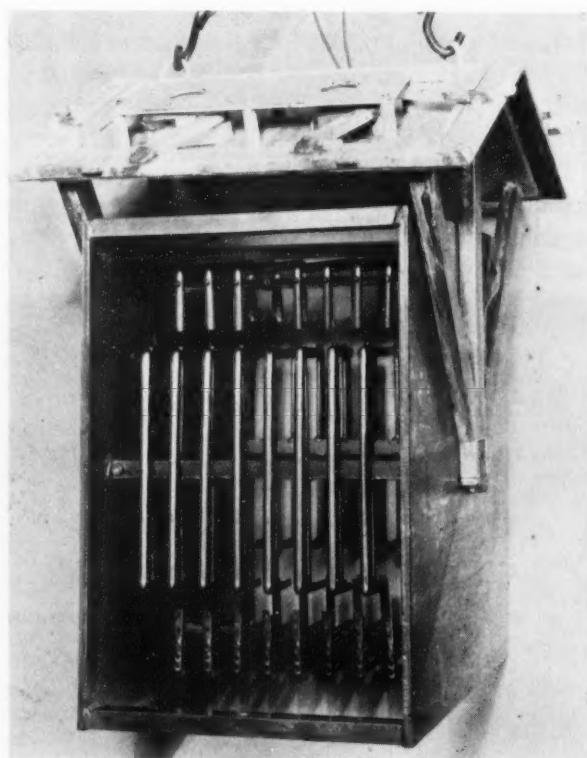


Fig. 7. Mounting of stainless steel channels; 64 units in two compartments.

during burnishing and produce deep scratches on the work pieces. In order to keep burnishing balls in perfect condition, it is recommended that they be stored in a solution that has a pH of 9.5 or over; this can be realized by the use of a dilute solution of soap, soda, or other alkali. Zinc slugs have also been used: the material being sufficiently heavy for use with steel or iron parts and not too heavy for brass or bronze coatings. Apparently, cutting can be realized⁷ with the addition of zinc slugs and an abrasive such as natural emery.

The abrasive employed, along with its shape and size, will vary with the shape of the part and the finishing operation desired. It should be of sufficient quantity so that all recesses, fillets, angles, and slots are reached without obtaining an objectionable wedging action. The normal ratio of abrasive chips to work parts is 3 to 1. Where a less exacting finish is acceptable, a 2 to 1 ratio is adequate and, in the event that close tolerances and fine finishes are required or, where recessed burrs are to be removed, the ratio may be as high as 6 to 1. Chip size is also another factor to consider. Where all other factors are equal, the larger chip will realize faster cutting, whereas, the finer chip sizes will permit better surface finishes.

In precision barrel finishing, the liquid carrier usually contains chemicals; the composition used to obtain a desired finish being dependent on the part type, the metal, and the operation to be performed. The composition of these additives, which may vary in acidity and alkalinity to perform proper lubricating, rinsing, deburring, descaling, grinding, and coloring of parts, are usually closely guarded secrets. However, they should function⁴ as a protective agent against corrosion, pitting and impregnation, hold the soil in suspension, keep the abrasive sharp and clean,

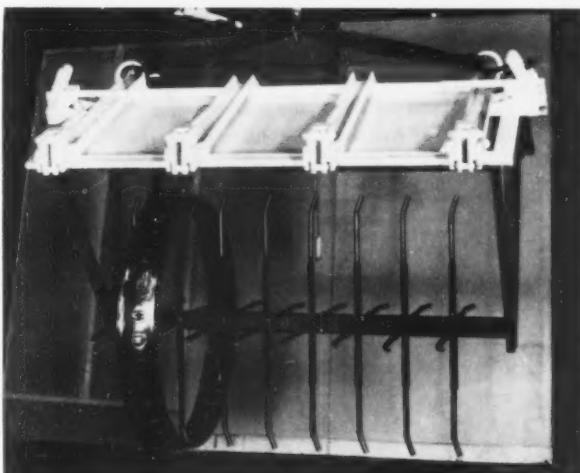


Fig. 9. 48 inch diameter jet aircraft engine support; fixture capable of loading six units.

and be self rinsing. Thus, whenever ferrous parts are tumbled, a rust preventative is included in the cleaner to prevent rusting and pitting; where the water is hard, a softener is usually added. In the rolling of steel, small amounts of alkali or cyanide will improve color; cream of tartar or cyanide will perform the same function for copper base alloys. Roughing operations require a non-lubricant cleaner whereas, in finishing operations, a lubricant type cleaner is used.

In the separation of the work from the abrasive after barrel finishing is completed, hand screens are normally used where production is small. For high production, mechanical separation usually is employed. In this method, the barrel load is dropped onto a conveyor belt at the end of which is a magnetic pulley or other type of separator. This method of separation reduces the danger of nicking the finished parts by manual handling. After separation, the parts are thoroughly washed and dried. In addition, the abrasive should be checked periodically for size, since the grinding action within the barrel will eventually wear the grain down. Rescreening and separation according to grit size is recommended.

Equipment

The barrel type along with the physical dimensions of the equipment are usually selected on the basis of recommendations which are determined through sampling processing and an analysis of the production requirements. Although details of the standard barrel types will not be given, the following comments may be of value, thus:

- (1) The *oblique* barrel and its modifications have the advantage in rapidity of loading and unloading of parts; the ability to inspect progress of work in progress; and the ability to tilt the barrel proper and thus change its elliptical motion. A disadvantage is that this barrel design is a low pressure unit and thus confined to relatively light loads.
- (2) The *horizontal* barrel design is most widely used in industry and ranges in size from 8 to 48 inches in diameter, and from 10 pounds to several tons as to load capacity. In addition, there are a number of modified designs which

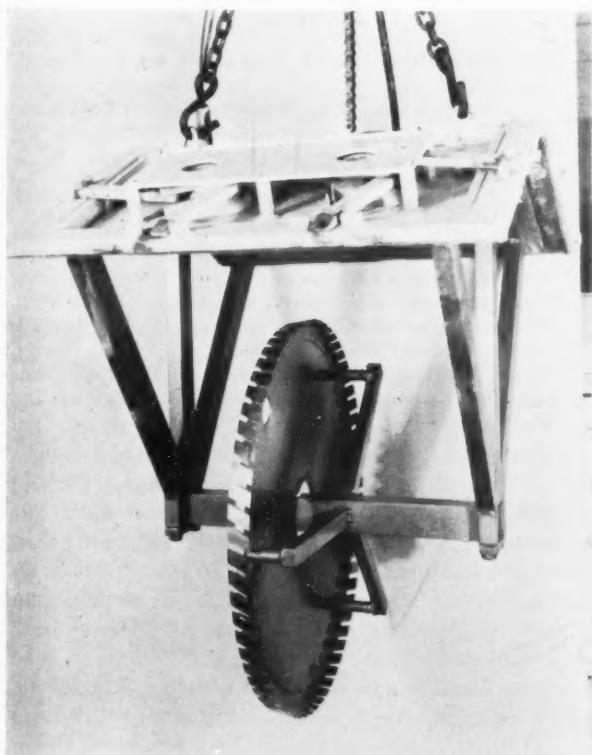


Fig. 8. Fixturing of stainless steel jet rotor compressor disc.

make them applicable to a large variety of work. They must be frequently vented in order to release any built up pressure, and the cover must be removed in order to inspect the work.

(3) Both the *end loading* horizontal and the *bottle neck* barrel design have the limitation that they are end supported. The former type is adaptable for the finishing of odd shapes whereas the latter type, which has the advantage of the oblique barrel in that it can be tilted at any angle to obtain variation of elliptical motion, is suitable for applications where a large amount of cutting is to be performed and the solution must be changed more frequently than in horizontal barrel design.

In a standard barrel finishing machine, the barrel contains the work parts, the compounds, abrasive media, and a liquid. Each load or cycle is an operation in itself, requiring loading, unloading, rinsing or flushing, draining, compound replacement, etc. However, in a modification of barrel finishing technique using a barrel design of the horizontal type, the process described above may be streamlined. Thus, in submerged finishing operations, a typical installation, which is illustrated in Fig. 5, consists of several stations which are in reality open end tanks that contain the correct formulation for specific operations. Into this tank, a perforated barrel or drum is submerged, containing both parts to be processed and abrasive media, and rotated for a specified time period. Upon completion of the cycle, the drum is raised by means of an overhead hoist installation and, after dwelling above the tank for proper drainage, it is moved over to the next tank or station where the succeeding operation is performed, and so on. Thus, tanks, along with formulated compounds and solutions can be arranged so that a series of operations can be performed in sequence, the barrel load and abrasive media staying intact until the last operation is completed.

This automatic method of handling, which can be divided into "In Line" or "Skip Station" system, can be used where high production is the rule rather than the exception. An example of the "In Line" system is given in Fig. 5; this unit consisting of two 9 station submerged lines. Each line is serviced by automatic working beams that index 9 barrels every 15 minutes from station to station during the processing cycle. The entire time cycle is 2 hours and 15 minutes; the barrel size is 22 by 28 inches; 400 parts are loaded, and a total of 3200 parts are barrel finished per hour. The operations performed are descaling, de-

burring, grinding, burnishing, rinsing, and rust inhibiting, in the proper sequence.

The "Skip Station" system, which resembles a merry-go-round, is also adaptable for automatic programming. To illustrate the performance, let us consider the problem of obtaining burr free, low micro-inch surface and minimum radii of plus or minus 0.0005" on machined, centerless ground metal parts. A 10 station system was installed allowing loading and unloading of a barrel every 4½ minutes; the stations including loading and unloading, a station for cleaning and degreasing, 6 stations for grinding and deburring, a clear water rinse tank, and a rust inhibiting tank. The parts are placed on a conveyor system and magnetic separation used to separate the work pieces from the abrasive media. The media is then screened. Total over-all cycle is 40½ minutes while the total barrel loads processed per hour are a little over 13.

Large or intricate parts, formerly thought to be impossible to finish other than manual methods, can now be processed using fixtures that are designed so that a maximum number of parts can be mounted and finished simultaneously in standard barrel equipment. Special holding devices can be used so that none of the parts' surfaces are shielded from the free flow of media during processing. Thus, in the installation illustrated in Fig. 6, 100 electric drill gun housing assemblies are mounted on simple holding posts. Fig. 7 illustrates the mounting of stainless steel channels in a vertical position; 64 units being in two compartments; Fig. 8 illustrates the mounting of a stainless steel jet rotor compressor disk, 7 units obtained in one loading; and, Fig. 9 illustrates the method of support of a 48 inch diameter jet aircraft engine support in which 6 units are obtained per loading.

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Surface Treatment and Finishing of Light Metals

Part XII-E. Plating on Aluminum - Hard Chromium and Non-Electrolytic Deposits

By S. Wernick, Ph.D., M.Sc., F.R.I.C., F.I.M. and R. Pinner, B.Sc.

HARD chromium plating of aluminum has been practiced for some years, principally on such components as cylinders, pistons and bearings and brake drums, and this method of producing hard, wear-resistant and, in some cases, oil-retaining surfaces has considerably advanced the use of aluminum alloys for many industrial and engineering applications. However, no components should be hard-chromium plated which are subjected to impact or shock in service due to the softness of the aluminum substrate. Table I shows some of the properties of aluminum alloys compared with the hard-chromium deposit.

TABLE I

Properties of Aluminum Alloys and of the Hard Chromium Deposit Compared

	Aluminum alloy	Hard chromium deposit
Hardness (Brinell)	50 to 150	800 to 1,000
Wear resistance	Fair to good	Excellent
Oil adhesion and wetability	Fair	Low on smooth surface Better on rough surface
Coeff. of friction	Medium	Low
Reflectivity	Medium (due to oxidation)	Good
Heat conductivity (Cal. per cm. per °C. per sec.)	0.20 to 0.40	Approx. 0.10
Melting point, °C.	530 to 630	1,765
Coeff. of expansion (°C. × 10 ⁻⁶)	18 to 24	7-8

The corrosion resistance of the hard chromium plated aluminum alloy is generally good and this is an important factor in the life of cylinders, particularly under conditions where sulphuric acid may be formed. As the coefficient of expansion of aluminum is approximately three times that of chromium, heating of hard chromium plated aluminum parts will cause cracking of the deposit; this, however, is not detrimental to the adhesion. On the contrary, the mosaic crack structure produced ensures that no stress is present in the coating which could cause exfoliation in service.

In general the pretreatment used in hard chromium

plating of aluminum today makes use of chemical etching, often with solutions containing heavy metal salts. Attempts to prepare the surface by abrasive blasting have usually been somewhat less successful.

Chemical Etching

Several methods which have been developed by means of which aluminum is plated directly after chemical etching have been discussed previously. Among those which have been suggested for use prior to hard chromium plating are 10 per cent caustic soda used at 50°C. and acid nickel chloride, cuprous chloride and manganous chloride solutions.

NICKEL CHLORIDE SOLUTION:

In a process described by Beerwald¹ the parts are first etched in 10 per cent caustic soda solution at 60°C., rinsed in cold water, then dipped in concentrated nitric acid, rinsed and immersed in a saturated solution of nickel chloride containing hydrofluoric acid or boric acid as addition agent. The parts are then rinsed and the nickel deposit is removed in nitric acid, after which the parts are rinsed and transferred to the chromium plating bath as soon as possible.

In a similar German process³ treatment in the nickel solution is followed by copper, iron, or brass deposition and subsequent dissolution of the coating by 1 to 2 seconds anodic treatment in the chromium plating solution. A similar solution, containing nickel chloride, hydrofluoric and boric acids has been described by Patrie.²

MANGANOUS CHLORIDE SOLUTION:

As an alternative to the nickel chloride bath described above, Patrie² found that better results were obtained on forgings and rolled products when using a solution containing:

Hydrofluoric acid (22°Bé) ... 50 per cent (vol.)
Manganous sulphate 2 to 3 oz. per gal.

None of the above solutions, however, are suitable for use with copper-containing alloys.

ZINC SOLUTIONS:

The use of the zincate process is sometimes applied to hard chromium plating. Thus, in the process described by Mall,⁴ the parts are first polished to a high

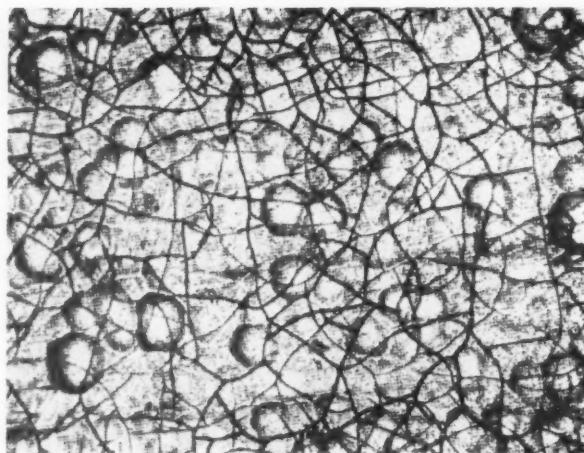


Fig. 1. Hard chromium coating on aluminum without after-treatment. The crack-structure is clearly visible.⁹ (X200)

finish, degreased, etched in an alkali solution, rinsed, and dipped in an alkaline sodium zincate solution. Subsequently, the parts are rinsed and transferred to the chromium plating solution where the zinc is dissolved before the current is applied. There is some evidence that the use of the double zincate treatment is generally preferable to a single zincate immersion in preparing aluminum alloys for hard chromium plating.

As is seen, most of the methods employ a heavy metal salt solution. Two reasons for this have been stated to be: (i) the formation of a large number of small electrolytic couples as the heavy metal is deposited on the aluminum, which leads to better etching; (ii) the protection of the metal from oxidation after etching and before plating by the heavy metal deposit. It is interesting, however, to note that in the zincate treatment as commonly practiced in decorative plating of aluminum, it has been found that dissolution of the first zinc deposit and redeposition of a second coating gives a denser coating containing a larger number of smaller grains which add to the adhesion of the fine coating.

Another process worth mentioning is that of Raub⁵ who used a ferrous chloride pickle followed by chromium plating at reduced temperature and high current density (30°C., 370 amp./sq. ft.) This method gave deposits of rather low hardness values, i.e., 550 to 650 V.P.N. Hardnesses up to 700 to 1,000 V.P.N. were obtained by raising the temperature of 40° to 55° C.

The hard chromium plating of copper-containing alloys such as those of the duralumin type is usually more difficult than that of aluminum or the magnesium- and/or silicon-containing alloys. However, these alloys, too, have been successfully hard-chromium plated by the etching technique,⁶ while in another process, drum castings have been plated with 2 to 3 mil hard chromium over an 8 mil nickel undercoating,⁷ in some cases by first applying a zinc deposit in the alkali zincate solution, followed by dissolving the coating in nitric-hydrofluoric acid solution and direct chromium plating.⁸

Chromium Plating

After preparation of the surface, the chromium plating operation does not differ essentially from that used

on other metals and described elsewhere adequately.⁸ The most usual solution is one containing:

Chromic acid	250 g./l.
Sulphuric acid	2.5 "

operated at 300 to 500 amp. per sq. ft. at 4 to 8 volts, giving deposits of 1,000 V.P.N. hardness.

ALUMINUM CYLINDERS:

Engine cylinders are one of the most common aluminum components to be hard chromium plated. The use of such cylinders rests on the light weight with good heat conductivity of the light metal coupled with the wear resistance of a hard chromium deposit of up to 6 mil thickness.

According to Meyer-Rässler⁹ a 7 per cent higher efficiency is obtained over cast iron while, in addition, the fuel consumption is reduced at the lower operating temperature of the cylinder. According to this author the wear of a chromium plated cylinder averages approximately 0.2 mil in 6,250 miles with greatly reduced wear of the piston rings as compared with cast iron. In Germany, the performance of these cylinders in the motor, aircraft and motorcycle industries has been described in a number of publications,¹⁰⁻¹⁴ heat-resistant cylinder alloys of the aluminum-silicon and aluminum-copper-nickel type being used for stampings while cast cylinders are made of aluminum-silicon-copper and aluminum-magnesium alloys. Similar applications have been described in the U.S.A. by Mall¹ at the Mall-Tool Co., Chicago.

In practice the cylinder bore is mechanically ground and polished, cleaned in alkali and pretreated as described above. The cylinder is placed into a fixture in which the round anode is exactly concentric to obtain a uniform electrode distance. As cylinders vary in diameter and length, it is usually necessary, however, to proceed by trial and error with each new type in order to find the optimum plating conditions. Edges should be rounded to avoid build-up of the deposit and give a dense plate.

POROUS CHROMIUM DEPOSITS:

Porous chromium deposits can be obtained for applications where oil retention is required.⁸ In addition to such chemical and electrolytic etching methods, depres-

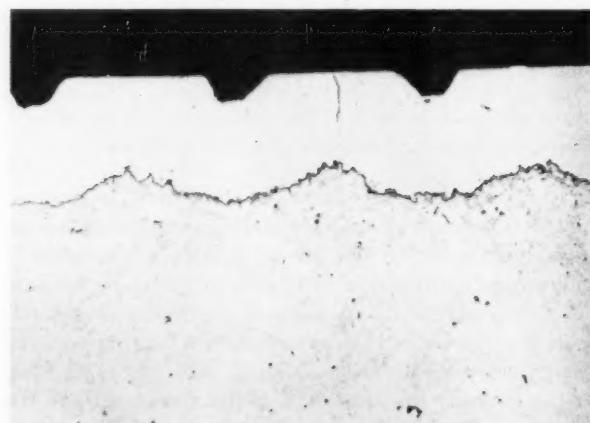


Fig. 2. Cross-section through the surface of a chromium-plated aluminum-alloy cylinder after service, showing the oil-retaining channels.⁹ (X200)



Fig. 3. Micrograph showing aluminum alloy cylinder after chemical etching and hard chromium plating. The lower part shows the aluminum alloy; the chromium is in the center; the upper layer is the mount.²

sions can be obtained mechanically before plating, particularly for pressed aluminum cylinders. The depressions are applied by a pressing technique after which the surface is rough turned and lightly honed before chromium plating.

The chromium deposit should not be applied more than approximately 0.2 mil oversize and it is important therefore to pay strict attention to the arrangement of cylinders and anodes in the plating bath. According to Meyer-Rässler,⁹ series production is best carried out by placing the cylinders end to end with gaps of only 0.1 mil.

Stripping of the chromium deposit from rejects or repair work is carried out by anodic treatment in chromic-sulphuric acid solution which does not attack the aluminum to any extent if the cylinder is removed without undue delay. Before re-plating, the cylinder bore is re-ground.

A number of other applications of hard chromium plating of aluminum have been proposed, among them the treatment of the bearing surface of aluminum pistons (in which case the cylinder itself would not be plated), parts of the pistons exposed to high temperatures,¹⁵ piston-rings, nuts and aluminum brake-drums, aluminum water taps and miscellaneous other components.

There are two complementary processes to hard chromium plating for some of the applications described. One of these, hard anodizing, has been described previously while the other, the application of ferrous and hard facing metals by metal spraying, is discussed in an earlier section. For aluminum cylinders of motor-bicycle engines a process involving lead plating, tin plating and graphiting has recently been developed in Italy.¹⁶

Tin Immersion Deposits

Tin is deposited on aluminum for two main purposes: to facilitate soldering and for its lubricating properties, e.g., on piston and engine components.

While tin can be electrodeposited on aluminum after suitable surface preparation, e.g., by the zincate, Vogt, or anodic oxidation processes, recent work has established that adequate tin immersion deposits can be produced for some purposes at relatively much greater economy.

A number of processes have been proposed for this purpose, including deposition from solutions of stannous chloride with and without ammonium alum or sodium hydroxide^{17,18} and Rochelle salt¹⁹; from sodium stannate solution²⁰⁻²² and from stannous sulphate-fluoride solution.⁸ Of these, the alkaline stannate bath, the neutral chloride-tartrate bath, and the fluoride bath are the most interesting.

STANNATE SOLUTIONS:

The stannate solution is in use in America for plating tin on aluminum pistons.²⁰⁻²² In England it has been described by Hoare,²³ and more recently has been the subject of investigation by Bryan.¹⁹

A typical plating sequence using the stannate bath is as follows:¹⁹

Degrease:

Etch at room temperature in sodium hydroxide, 50 g./l. for 5 minutes;

Rinse:

Etch in 60% phosphoric acid (d. 1.75) - 40% nitric acid (d. 1.42) (vol.) at 60° to 65° C. for 5 minutes;

Rinse:

Plate in 100 g./l. sodium or potassium stannate solution at 55°C. for 1 minute.

According to Bryan, slightly brighter and more adherent deposits are obtained by using potassium stannate in place of the sodium salt.

Effect of Free Alkali:

In operation the pH of the bath increases and this adversely affects the adhesion of the deposit. Immersion times must then be shortened. As no buffer will operate at the high pH encountered (pH 12 to 13), attempts have been made to add compounds to counteract the acidity directly or to act as corrosion inhibitors. The addition of ammonium sulphate, which liberates sulphuric acid in the solution during the deposition (ammonium is evolved), was partially successful in improving the adhesion but gave a bronze-colored deposit. Similar results were obtained by direct addition of sulphuric acid to maintain the pH at 12.1.

Bryan found that at higher potassium-stannate concentrations, i.e., above 0.67N (approximately 200 g./l.), the solution has a pH of 12.47 and no preliminary acid etch is required to obtain satisfactory adhesion. Equivalent solutions of sodium stannate gave slightly inferior results.

Addition Agents:

Of several addition agents tested in the potassium stannate solution, potassium dihydrogen phosphate and

a combination of zinc acetate and *m*-cresol-sulphonic acid have given some improvement. In this way, good deposits have been obtained by etching in 50 g./l. sodium hydroxide solution for 1 minute at 75°C., etching in cold 50% (vol.) nitric acid for 1/2 minute, rinsing and plating for 5 to 10 minutes in a solution containing:

Potassium stannate	200	g./l.
Potassium dihydrogen phosphate	100	"

for 5 to 10 minutes at 60°C. Small additions of potassium dihydrogen phosphate are made during use.

The most promising solution using the second type of addition agent contained:

Potassium stannate	100	g./l.
Zinc acetate	2	"
<i>m</i> -cresolsulphonic acid	33	"

This solution, used at the normal operating conditions for 2 minutes plating time, eliminated the need for an acid etch, was somewhat more stable than the plain stannate bath, and gave deposits with better adhesion which could be polished easily to a bright, reflecting finish.

The thickness of deposits obtained in this way varies from about 0.045 to 0.055 mil, the thinner deposits being obtained on polished aluminum. The life of the solution is approximately 30 sq. ft. per gallon.

STANNOUS CHLORIDE SOLUTION:

The pure stannous ion solutions are not satisfactory for plating on aluminum. Somewhat better results are obtained using chloride rather than sulphate solutions but, to obtain smooth deposits without pitting, addition agents are essential and the pH of the solution must be increased to near neutrality.

A solution which has been stated to give smooth deposits 0.2 mil thick and with an adhesion of 1.5 tons per sq. in. contains:

Stannous chloride ($\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$)	100	g./l.
Rochelle salt	200	"
Hydrolyzed glue	5	"
Sodium hydroxide	Added to pH 7.0 to 7.5 (approx. 25 g./l.)	

This solution is operated at 70°C. for 4 minutes. Prior to plating, the aluminum is etched in 50 g./l. sodium hydroxide solution containing a wetting agent for 5 minutes at room temperature, after which it is etched in an acid solution. A suitable acid etch given by Bryan contains:

Hydrochloric acid (conc.)	2.5	ml./l.
Trichloracetic acid (melted crystals)	50	"
Phosphoric acid (d. 1.75)	250	"
Lactic acid (d. 1.21)	200	"
Lissapol N	3	g./l.

The time of etching is fairly critical; 1 minute at 75°C. gives the best results, shorter etching giving pits and longer etching, rough deposits.

Immersion tin plating has been proposed as a base for electrodeposition by Suchy¹⁷ who used a solution containing 10 g./l. stannous chloride. After immersion, the aluminum was heated to 500° to 600°C. for 5 min-

utes, causing the tin to diffuse and form a tin-rich surface layer.

STANNOUS SULPHATE-FLUORIDE SOLUTION:

This solution, developed by Heiman,²⁴ in many ways appears one of the most promising. A typical solution used on commercial aluminum contains:

Stannous sulphate (SnSO_4)	161.1	g./l.
Hydrofluoric acid (48%)	70.0	"
Hydrolyzed glue	1.0	"
Goulac	0.2	"
Purified residue acid	1.3	ml./l.
pH	0.2 to 1.0	

The hydrolyzed glue is prepared by boiling with caustic soda solution in a reflux condenser and acidifying with sulphuric acid. Goulac is a sulphite paper pulp waste containing lignin sulphonates. The purified residue acid is a mixture of high-boiling coal-tar phenols with a distillation range: Initial boiling point 102°; 5% = 212°; 50% = 235°; End point = 90% 276°C.

The working temperature of this solution is 25°C. and the time of immersion varies from 5 to 10 seconds. Fairly vigorous agitation is recommended. The plating sequence used by Heiman is as follows: Alkaline clean; rinse; acid etch (0.5N hydrofluoric acid, 25°C., 2 to 3 minutes); rinse; 70 per cent nitric acid (d. 1.42) dip at 25°C. for 10 to 20 seconds; rinse; tin immersion plating.

The plating time is fairly critical and should not generally exceed 10 seconds. The adhesion obtained is stated to be superior to that obtained with deposits from the stannate bath. A solution given in another patent²⁵ is similar but has ammonia added to pH 5.5 to 6.5.

Immersion Silver Deposit

Immersion silvering may be applied to aluminum after it has been anodized, when the process may be carried out in much the same way as silvering glass. In one such process developed for the Ministry of Supply,²⁶ the aluminum is degreased, pickled in dilute hydrochloric acid with or without nitric acid, and rinsed in distilled water.

The actual silvering is carried out with 3.33 ml. of a 10 per cent silver nitrate solution to which a solution of 86 ml./l. ammonium hydroxide (0.880) are added until the precipitate first formed is just redissolved. Subsequently, 30 to 50 ml. excess ammonium hydroxide solution are added. The total volume of the solution is then approximately 660 ml.

The reducing solution is made up by dissolving 30 gm. Rochelle salt or 40 gm. potassium citrate in distilled water and making up to 330 ml.

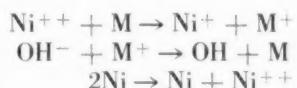
Both solutions are filtered and are then mixed in a glass or porcelain vessel for use.

Chemical Nickel Plating

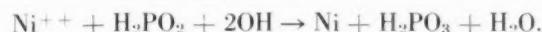
The "chemical" nickel plating process, first used by Brenner and Riddell at the National Bureau of Standards and further developed in recent years in America, has recently been applied to the direct nickel plating of aluminum.

This process is a chemical reduction process by which the metal is precipitated in the presence of a

hypophosphite which acts as the reducing agent. The deposit obtained is claimed to be virtually free from pores. The mechanism of deposition is not yet clear. According to Bremner²⁷ a one-stage process is concerned in the case of the alkaline solution of the type used on aluminum. The basis metal donates an electron for the reaction:



the total reaction being



According to Brenner,²⁸ hydrogen is discharged in the first part of a two-stage process, the excess energy liberated by the hydrogen evolution activating the discharge of nickel ions.

An alkaline solution used with success has been described by West²⁹:

Nickel chloride	3 lb.
Sodium hypophosphite	12 oz.
Sodium citrate	7.2 lb.
Ammonium chloride	4.8 lb.
Ammonium hydroxide (Sp. Gr. .880)	600 ml.
Water	10 gal.

This solution is maintained at pH 10 by addition of ammonium hydroxide (approximately 500 ml. per 30 sq. ft. of work). The temperature is kept at 180° to 190°F. and carbon steam coils may be used to heat the solution which is contained in a glass or vitreous-enamelled tank. The reaction is very violent and the plating speed is stated to be 2 mil per 30 minutes for a new solution, though this falls off with use. Plating racks or baskets should be of plain carbon steel. Small work plated in baskets should be taken from the solution occasionally and shaken. Nickel deposited on tank walls, heating coils and plating racks is stripped off in 50 per cent nitric acid solution.

As distinct from the acid solutions used for plating ferrous metals, this solution will not deteriorate with time but can be maintained by addition of the original components.

The main advantages of the chemical process are the unique throwing power of the solution in which even long, small-diameter tubes may be plated provided that a flow of the solution is maintained through the tube. For similar reasons the process may also be suitable for plating threaded parts, while another application of the process is the plating of the interiors of tanks and large vessels.

An interesting application is operated in standard production by the Wright Aeronautical Corp.³⁰ Here electroless nickel plating is applied for the protection of annular grooves in light alloy pistons used in high-power aircraft engines at 500°F. In this application, axial clearance must be given between the piston ring and the side wall of the groove to leave room for the ring to expand and contract radially. The purpose of the deposit is to protect the walls from damage by the striking of the ring during service. Pretreatment in this instance is by cleaning in a chromic-sulphuric acid or nitric-hydrofluoric acid mixture, followed by plating

with 0.5 to 1.2 mil nickel from an alkaline solution. Following deposition the parts are heated to 450°F. for 30 minutes to increase the hardness to 600 V.P.N. A number of other applications have been found for the process in the American aircraft industry.²⁸

For most ordinary applications the process is, however, too expensive to be considered as an alternative to electroplating. "Electroless" nickel deposits contain between 6 to 7 per cent phosphorus and are not normally suitable for chromium plating.

THE ALNICLAD PROCESS:

The use of aluminum-alloy propeller blades for aircraft flying at high speeds has been responsible for the development of a new plating process. Under the severe corrosion-erosion conditions to which these propellers are subjected, the application of a wear-resistant surface coating such as nickel is essential.

Nickel plating by conventional techniques proved unsuccessful, due in part to galvanic corrosion, partly to non-uniformity of the deposit and relatively low adhesion to the aluminum.

In the new process,³¹ the duralumin-type propeller blades are first anodized, after which a rubber bonding material is applied by immersion and the blades are dried.

No details are given of the rubber bonding processes or of any means used to render the coating conductive for nickel plating. The nickel deposits are stated to be hard and unstressed and can be polished electrolytically or mechanically to a high finish.

This process is stated to be used by the American Air Force and Navy on a number of aircraft types.

CARBONYL PLATING:

Nickel carbonyl plating on aluminum has been patented recently in America.³² In this process the work is cleaned and treated in a mixture of gaseous nickel carbonyl and inert gas at 175° to 400°F. Subsequently, the work is heated to 500° to 1,200°F. in carbon dioxide and exposed to nickel carbonyl gas at a temperature high enough to cause deposition. Relatively porous deposits between 0.05 and 0.15 mil thick are obtained and it is doubtful whether the process has much commercial significance at the moment. The nickel carbonyl process requires special equipment and is described in greater detail in the literature.³³

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Finishing Pointers

The Water Separator in Vapor Degreasing

By Max Randall

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IN vapor degreasing, as commonly used by industry, the dissolving action of dry trichlorethylene or perchlorethylene is utilized to remove oils and grease from all types of metal products. Whether the cleaning action is by vapor condensate and liquid spray or dip, it is important for maximum efficiency of the process that the solvent be kept free of undissolved water. The moisture is controlled by a water separator which is an essential part of the degreaser. An examination of the possible sources of moisture and the characteristics and effects of solvent-water vapors reveals the function of the water separator and the importance of its maintenance to insure proper operating conditions and long life of the equipment.

In the absence of free water, the solvent vapors in a degreaser are transparent that is to say, invisible. The presence of excess water causes the formation of a fog known as "ghost vapor" or, when mixed with air, as "false vapor." This "ghost vapor" or "false vapor" tends to float or billow and can be easily lost to the working area by a slight disturbance of the vapor level even if draft conditions are relatively mild.

Effect of Free Water in a Degreaser

Generally speaking, there are four important effects produced by the presence of excessive amounts of moisture in a degreaser: —

(1) *Increased solvent costs:* the solvent-water vapors described above, the easily recognized ghost vapors, have both lower vapor densities and lower condensing temperatures than the pure solvent vapors. As a result, it is difficult to hold ghost vapors within the degreaser and their escape into the surrounding atmosphere increases solvent costs — and may create health hazards. Other conditions being equal, solvent diffusion losses from a wet degreaser are usually 20-30% higher than those from a degreaser which is free from undissolved water.

Deterioration of equipment: Excessive moisture in the degreaser may accelerate atmospheric oxidation, or rusting of equipment at or near the vapor line.

(3) *Staining of work:* Under some conditions, water spotting and staining of the cleaned work may result

from the presence of free water in the degreasing solvent.

(4) *Inferior Cleaning:* The presence of ghost vapors or false vapors may also result in less efficient soil removal because solvent-water-air mixtures produce less solvent condensate on the work — not only because of their relatively low solvent vapor content, but also because of their low condensing temperature. Inasmuch as the ghost vapors are produced by a solvent-water mixture with a boiling point below that of the solvent, the work comes up to the vapor temperature more rapidly than in pure solvent vapors, owing to the reduced temperature differential. Thus, less time is allowed for the vapors' degreasing action. Little or no cleaning takes place after the work has reached the vapor temperature, so that there is no advantage in leaving the work in the degreaser for a prolonged period.

How Water Enters a Degreaser

Water enters a degreaser from five different sources:

(1) Moisture from the atmosphere may enter a degreaser by condensing on the cooling surfaces in the degreaser — as the sweating or "dewing-out" frequently observed on cold surfaces. The amount of water thus introduced can be held to a minimum by proper control of the cooling water temperature. The water temperature at the condenser outlet should be maintained above the dew-point of the atmosphere (about 100-120°F.); that is, the water should feel warm to the touch. Water outlets from condenser jackets and coils should not be connected directly to sewer lines, but should drain into an open sight device such as a funnel so that water flow can be readily observed. Automatic devices are available to control water flow.

(2) Water may enter the degreaser by drag-in on the work being cleaned.

(3) Trichlorethylene vapors and perchlorethylene vapors form mixtures with water vapor which condense at temperatures below the boiling points of either the solvent or water. Such condensations from humid shop atmospheres are a common source of moisture found in vapor degreasers. Where heavy work loads or large racks cause turbulence of the vapor layer in a degreaser, the mixing and subsequent condensing of solvent vapors with moisture will be accelerated.

(4) Occasionally, leaks in the water or steam coils are responsible for the presence of excessive amounts of moisture in a degreaser.

(5) After normal cleanout, water may remain trapped in lines, hidden crevices, etc., or the walls of the degreaser may be left damp. In such instances heavy ghost vapors may be noted when the degreaser is started up, even if new solvent is charged to the unit. These ghost vapors usually disappear after one or two hours of operation, if the water separator on the degreaser is functioning properly.

How Water Is Removed

Although water vapor and solvent vapor mix freely, the liquids separate into two layers when they condense. The combined condensate collects in a trough and flows from the degreaser through a precooler to a simple decanting device known as a *water separator*.

(Continued on page 64)

The Modern Chlorate-Accelerated Phosphating Bath

By Edward Heinzelman, Jr., Oakite Products, Inc., New York, N. Y.

PHOSPHATING practice has advanced in scope and efficiency since the inception of the original Coslett phosphoric bath. As treatment time was shortened and method of application broadened, the phosphating process found wider commercial acceptability and exploitation. The phosphate treatment may be applied to metal surfaces by tank immersion, industrial spray washer or variations thereof, or brushing. Present day baths, in most cases, require from five minutes to less than one minute treatment time, i.e., industrial spray washers commonly provide less than one minute application. By far the largest use of phosphate coatings has been as a treatment before painting or other finish in order to increase adhesion and enhance corrosion resistance. In recent years the ability of the phosphate coating to hold lubricants and provide parting layers has been used to good advantage in cold drawing operations and also as a palliative for fretting corrosion. In addition, many specialized applications have been found for phosphate coatings.

The present day "fast" baths use various types of accelerators in order to promote the phosphate reaction in the desired short time. Oxidizing agents such as nitrates, chlorates, nitrites and peroxides are among the more popular ones. They are used alone, in combination with each other, or with metallic as well as other organic or inorganic accelerators. It is the purpose of this paper to discuss chlorate-accelerated phosphating solutions and to compare them with nitrate-accelerated baths.

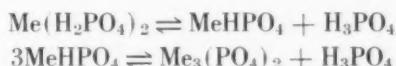
Accelerators and Their Action

One of the earliest references to the use of chlorates as accelerators for phosphating solutions appeared in French Patent No. 724,422. W. Schmidding, in German Patents 310,756 (1922) and 448,009 (1926), used a phosphate solution containing chlorate to accelerate formation of a "rust-resisting layer" on iron and steel. Although the use of chlorate accelerators has many advantages which will be discussed later, certain difficulties were encountered in early commercial use. The phosphating bath initially exhibited a milky turbid color followed by development of a gelatinous suspension and its precipitation as a sludge. This gelatinous precipitate not only fouled up equipment but also coated articles with a white deposit which resisted removal by rinsing or other means.¹

It appears that Darsey, in U. S. Patent No. 2,293,716

(1942), eliminated the difficulties inherent with the gelatinous deposits by using a combination of chlorates and nitrates. However, the nitrate-chlorate accelerated bath proved to be highly corrosive in nature and particularly so to equipment. It is claimed that chloride ion is formed as a reduction product of the chlorate ion and this, in turn, with the nitrate ion forms the components of *aqua regia*.² It is extremely unfortunate that the earlier difficulties with gelatinous precipitation and the corrosive behavior attributed to the nitrate-chlorate combination have stigmatized the later chlorate baths, which have resulted from extensive research. The acquisition of further knowledge on the effective use of chlorate accelerators has resulted in efficient baths which, it is believed, are much less harmful to equipment than the most commonly used nitrate-containing phosphate baths.

In general, it has been found that metal content, catalyst or accelerator, and correct pH value play an important part in the quality and type of phosphate coating. It is evident that all accelerators or oxidizing agents do not produce the same results, nor are the optimum conditions the same for all baths. The pH range is dependent upon the particular heavy metal phosphate used and the soluble phosphate content of the solution with the specific oxidizing agent. There are a variety of reaction equilibria taking place in the complex phosphating system but the coating and various solids in the bath result from the following equations:



where Me may be a heavy metal such as Fe, Zn or Mn. In the case of the zinc phosphate bath, the coating may consist of both zinc and iron phosphates.

The colloidal particles and resultant gelatinous precipitate which plagued the early chlorate-accelerated baths were formed in the intermediate stages of the above reactions. It was seen that a key to the successful use of chlorates is the maintenance of a definite pH range in order to suppress the precipitation of insoluble phosphates or hydrolysis of the heavy metal phosphates. It appears that hydrolysis decreases with increasing concentration of the heavy metal phosphates and also with an increase in the free phosphoric acid. But there is a limit to the metal phosphate concentra-

tion beyond which the processing time and phosphate crystal structure are adversely affected. Increased chlorate concentration seems to help counteract this effect but, again, a concentration limit exists beyond which increased chlorate causes additional hydrolysis. Furthermore, since phosphoric acid is involved as a product in most of the reaction equilibria it cannot be used as a means of pH control. Excessive free phosphoric acid may result in a pickling rather than coating action, or in the deposit of inferior coatings with attendant longer process time. Small amounts of certain acids (not H_3PO_4) and/or certain buffers have been useful in controlling the pH so that the form of the precipitate is changed from a gelatinous floc to a controllable powdery solid which settles out rapidly with the normal phosphating sludge.

It is obvious that a combination of factors must be considered in order to make the best use of chlorates as accelerators. Control of the concentration of the various chemicals to obtain more efficiently balanced solutions; control of hydrolysis in the concentrate and the working bath; control of pH within certain optimum ranges; and the means of attaining these controls learned through research are the major factors responsible for the successful application of the more modern chlorate-containing baths. Of course, many of the aforementioned control methods, i.e., specific details, are incorporated in proprietary products and are not freely available in the literature.

Function of Oxidizing Agents

There have been various theories expounded on the mode and manner in which oxidizing agents function in the promotion of the phosphating reaction. Identical behavior is not exhibited by all accelerators but most generally they are presumed to function as follows: Act as depolarizers — remove hydrogen film from the metallic surface by conversion to water; help maintain and adjust the balance of the solution; and act on the ferrous ion produced in the phosphating bath.

Nitrate-containing baths differ from chlorate baths in behavior towards the ferrous ion. The ferric ion has increased solubility in nitrate-containing baths as compared to nitrate-free solutions.³ It is stated that the ferric ion aids the phosphating reaction because, in acid solution, it will react readily with hydrogen, being reduced to the ferrous ion in the process.² This means that iron has an opportunity to become part of the coating and, also, that the bath contains not only ferric but ferrous iron in solution. On the other hand, chlorate baths are practically free of iron in solution since the ferrous ion has little chance to exist under the influence of the chlorate and the ferric ion drops out with the sludge. The coating, then, from a chlorate bath should contain considerably less iron than one obtained in a nitrate bath.

From a mechanistic standpoint it appears that the oxidizing agent acts as a catalyst in promoting the phosphate reaction but does not actually become part of the coating itself. The particular oxidizing agent may influence the ratio of iron and zinc in a zinc phosphate coating, as in the case of nitrate and chlorate baths, but it evidently does not affect the chemical nature of the coating in any other way. From a corro-

sion standpoint a phosphate coating which presumably consists predominantly of zinc phosphate (chlorate bath) should provide at least equal if not better resistance than one composed of a proportionate ratio of zinc and iron (nitrate bath). This has been shown experimentally.

The oxidizing agent does have a profound effect on the physical nature of the coating, i.e., structure and size of the crystals, and also on the phosphate reaction time. Chlorate baths produce very fine crystal structures while nitrate baths generally produce a coarse-grained structure. The natural tendency for very small crystals to pack closely produces low porosity (small pores between crystals) with attendant corrosion protection. The very rapid formation of the phosphate coating in chlorate baths indicates high nucleation rates and grain growth at many sites. Consequently, the reactive surface available is quickly used up, and the probability of large crystal growth diminished by mutual interference of the growing crystals. Evidently, the coarse-grained phosphate structure produced from nitrate baths results from low nucleation rates with the slow growth of large crystals.

It must be pointed out that by combining nitrate and nitrite in the phosphating bath, it is possible to obtain the desirable performance and crystal structure described above for the chlorate bath. Both of these baths may be used at lower processing temperatures than the nitrate bath.

A disadvantage of the nitrite-nitrate combination is the necessity of adding nitrite separately (nitrite is unstable in the concentrate) and of adjusting the solution balance with caustic soda. Thus, three materials demanding control are necessary to achieve the same result as a single-material chlorate bath with relatively simple control.

Corrosion Characteristics

The improved chlorate-accelerated baths have shown less corrosive effect on equipment. This seems entirely justifiable from a chemical standpoint since the bath contains little or no iron in solution, and is highly buffered; from a physico-chemical standpoint the very fine-grained structure of the phosphate coating with uniformly complete coverage tends to protect the metal surface and stifle further reaction. Thus, under many conditions, it is possible to use ordinary wrought or black iron equipment.

Several experiments were conducted in order to determine the corrosion-erosion effects of chlorate-containing solutions. Stainless steel specimens, type 304, were mounted in a slotted stainless rod and held thereby by means of a set screw, and the unit then attached to a laboratory stirrer. The test panels were suspended in a chlorate bath. In order to obtain erosion or velocity effects the panels were rotated in the solution. Cyclic effects were obtained by alternately rotating at temperatures between 160°F. to 200°F. for 7½ hours and then standing for 16½ hours at ambient temperature with no rotation. These tests were carried out for a period of from two to four weeks. Test panels were accurately weighed on an analytical balance before and after the test. Corrosion rates were calculated in accordance with Fontana.⁴ It was noted that in an unused

chlorate bath (no other metal but test panels put through the solution) the weight loss indicated corrosion rates between 0.0089 to 0.0267 mils per year which are well within the acceptable rates as set forth in the Huey Test.⁴ In a chlorate bath that had been worked with steel panels before testing, a weight gain was actually obtained, indicating a protective film or coating had been formed. Removal of this film by the usual chromic acid stripping method⁵ revealed no deleterious effect on the metal surface from the test exposure.

Conventional corrosion tests were made to compare the performance of phosphate coatings obtained in standard modern chlorate-accelerated and nitrate-accelerated zinc phosphate baths. The chlorate bath was applied by spray and also by immersion. The nitrate bath was applied by immersion only, since its use by spray would, necessarily, involve separate additions of sodium nitrite. As a control, one set of test panels received no phosphate treatment.

Table I illustrates the experimental procedure in the form of a flow diagram. Table II contains reference notes indicated above the right corner of specific boxes or levels. Capital letters indicate treatment and ultimate corrosion test, i.e., salt spray, water immersion or humidity, and serve to identify each panel's path through the diagram.

In the salt spray test, the panels which had received no phosphate treatment failed in 23 hours; those treated by spray in the chlorate bath failed in 500 hours; and those treated by immersion in both the chlorate and the nitrate baths failed in 540 hours. The

greater resistance produced by immersion may be attributed to the probability that the longer treating time provides more uniform coatings. After 142 hours of water immersion the non-phosphate-treated panels showed dense, size 8 blisters while the spray chlorate, and immersion chlorate and nitrate panels showed no blisters after 914 hours exposure — they were equally well preserved. The same effects were noted after the 1560-hour humidity test — all phosphate-treated panels, regardless of method, were in excellent condition. The foregoing test results serve to indicate that the advantages attributed to the chlorate-accelerated bath are not gained at a sacrifice in corrosion resistance. At worst, the chlorate bath performed on a par with the nitrate bath while the thin, fine-grained, and lower weight chlorate-accelerated coating would indicate less absorption of paint with superior performance under impact and bend tests.

An attempt has been made to present the salient features of chlorate-accelerated phosphate baths, to cite improvements in the modern chlorate bath in order to differentiate it from its older prototype, and to compare the behavior of the chlorate bath and the corrosion resistance of the phosphate coating obtained therein with the more commonly known nitrate-accelerated baths.

Conclusions

In summary, the modern chlorate-accelerated zinc phosphate baths offer the following features:

1. The phosphating bath is immediately ready for use with low consumption of chemicals which are

Table I—Experimental Flow Sheet

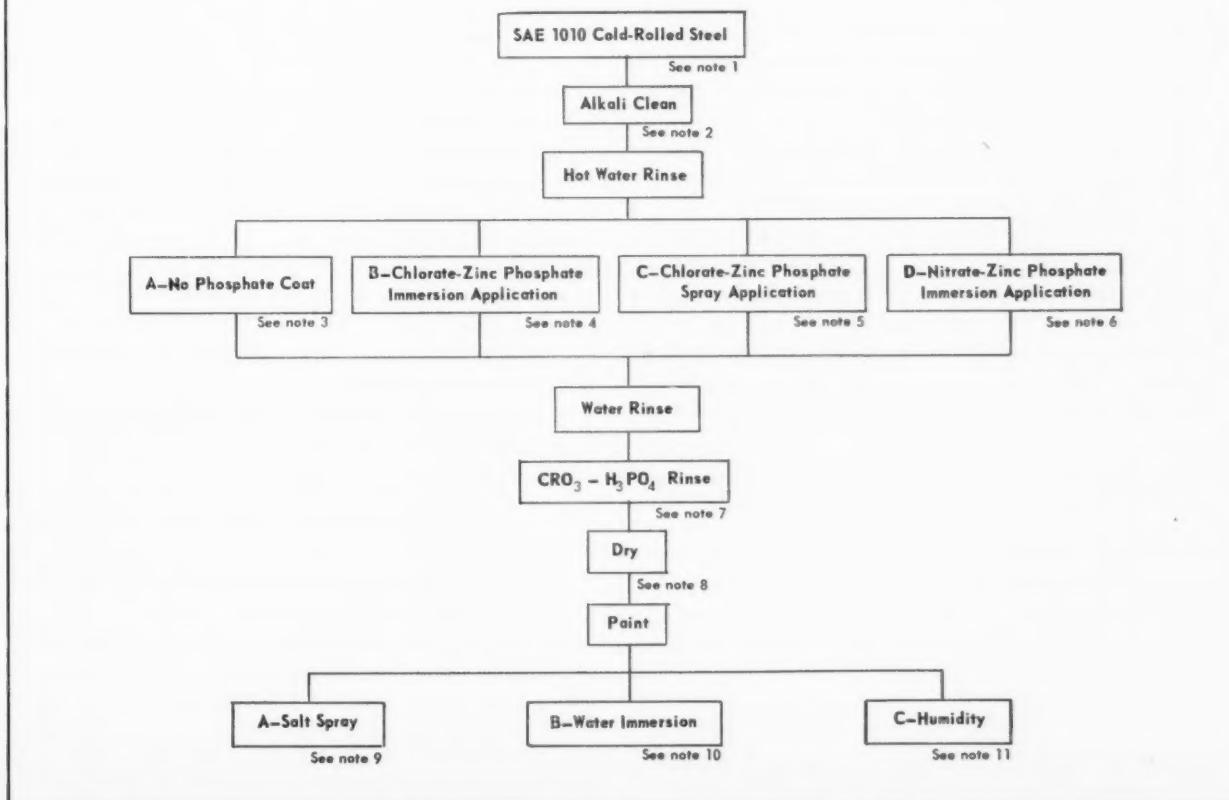


TABLE II
Flow Diagram Notes

1. SAE 1010 cold rolled auto-body sheet stock, 20 gauge, commercial quality.
2. Alkaline material 5 oz./gal., 170-180°F., 5 minutes.
3. No surface treatment — surface alkali cleaned only.
4. Chlorate-accelerated zinc phosphate bath — 2% by volume, 170-180°F., 4 minutes, applied by immersion.
5. Chlorate-accelerated zinc phosphate bath — 2% by volume, 150-160°F., 55 sec., applied by spray machine.
6. Nitrate-accelerated zinc phosphate bath — 2.5% by volume, 190-200°F., 5 minutes, applied by immersion.
7. Final acidified rinse — $\frac{1}{16}$ oz./gal. (sufficient to obtain pH 2.5-4.5), 140-160°F., 30-55 sec.
8. Black enamel applied by Fisher-Payne Dip Coater — force dry at 120°F. Visc. 45 sec. No. 4 Ford Cup.
9. Standard salt spray test
ASTM B 117-54T 5% NaCl solution.
10. Water Immersion test ASTM D 714-45.
11. Humidity Test ASTM D 714-45.
Humidity Conditions 95% at 100°F.

easily replenished to maintain operating efficiency.

2. The phosphate coating forms rapidly (30 sec. to 5 min.) at low operating temperatures. Temperatures may vary from 160°F. to room temperature depending upon the particular bath make-up.
3. A thin, fine-grained phosphate coating is deposited from a bath which is made up and replenished with a single unit concentrate. Only simple controls are required.
4. The buffered and virtually iron-free bath plus the protective nature of the coating results in little or no adverse effect on equipment.
5. The iron content of the bath is extremely low and remains fairly constant. This affects phosphate coating quality and solution behavior.
6. The coating provides excellent corrosion resistance with minimum paint absorption. Corrosion resistance is satisfactory as determined by salt spray, water immersion, and humidity tests.
7. The thin, fine-grained coating provides a pliable film which performs well under impact and bend test.
8. The slight increase in thickness caused by the phosphate coating does not usually affect dimensional tolerances.
9. The coating is useful as an aid in cold drawing steel.

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FINISHING POINTERS

(Continued from page 60)

The design of water separators is based on the elementary principle of gravity separation. Condensed water floats on the surface of the heavier solvent condensate layer and flows continually to a sewer from an upper outlet of the separator. Under ordinary conditions, with a proper balance between heat input and cooling capacity at the degreaser, water from the various sources described will vaporize and be condensed and carried with the solvent condensate going to the water separator. It is essential that the temperature of the solvent condensate going into the water separator, be substantially below the boiling point of the solvent-water mixture, which latter temperature is below the boiling points of pure trichlorethylene or perchlorethylene and of pure water.

Water separators should be inspected periodically to make sure that:

- (1) The vent line is clean.
- (2) The separator tank is free from accumulated sediment or sludge.
- (3) The solvent and water outlets are clean and free from restrictions to flow.

The importance of the water separator cannot be over-emphasized. Without this accessory, the incoming water either accumulates in the degreaser to a point where good cleaning of the work becomes impossible or it continually diffuses into the atmosphere with solvent in the form of ghost vapors.

Science for Electroplaters

24. Chemical Surface Preparation - C.

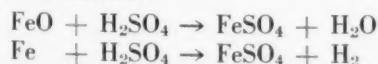
By L. Serota

Acid Dip

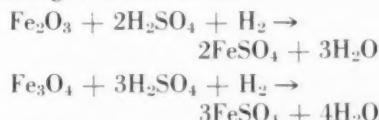
After the alkaline (electro) cleaner has removed the dirt and oil from the surface of metal, an acid dip is required before plating, to neutralize the alkaline film and remove the thin oxide coating. Hydrochloric or sulfuric acid or mixtures of the two are commonly used for ferrous metals. The acid has a dissolving action on the oxide film. The term 'acid dip' usually refers to such treatment when the time required to remove light rust and scale or smut, after the alkaline cleaning cycle, is about one minute.

Pickling

When the metal is coated with a heavy rust and scale resulting from heat treatments, forging, welding, or atmospheric conditions, a stronger acid (or mixture) is used to remove the rust and scale. This process is called pickling. Sulfuric acid, because it is cheaper, is commonly used in large scale pickling operations. Rust is removed in pickling by direct dissolution, but scale is mainly cleaned away by acid attack on the lower layers of ferrous oxide, causing mechanical lifting of the scale. The chemical reactions are as follows:



The higher oxides are dissolved according to these reactions:



The effects of acid concentration and temperature are indicated clearly in Fig. 124. At a low temperature (20°C) a higher sulfuric acid concentration (25 per cent) is necessary to reduce the picking time of cold rolled, close annealed steel. The graph indicates that an acid concentration of 5 to 10 per cent by weight and an operating temperature of 60°C . to 80°C . is most favorable.

Inhibitors

The rapid action of the pickling solutions upon steel introduces such difficulties as excessive acid consumption, loss of metal by unnecessary dissolution, etching, and pitting. These may be reduced by the addition of agents known as inhibitors. Such substances have the effect of accelerating the solution of the oxides and retarding the dissolving action of the acid on the exposed steel. Frequently such materials (inhibitors) form a scum or foam on the liquid surface which serves to reduce the loss of acid by spray. Picking inhibitors are usually organic compounds, which probably leave a preferential deposition film of a colloidal nature on the iron or steel but not on the rust or scale. This has the effect of retarding the liberation of hydrogen and influencing migration of polar compounds to the metal. The result is an increase in hydrogen overvoltage. Reduction of hydrogen evolution has the added benefit of lessening hydrogen embrittlement. The film of inhibitor remaining after pickling is usually removed by anodic alkaline cleaning.

Electrolytic pickling is coming into use in place of the immersion process. Both anodic and cathodic processes are employed. The anodic electropickling method is preferred because it eliminates the hydrogen embrittlement which results from cathodic cleaning. The electrolyte is usually sulfuric acid.

Oxide coatings on copper base alloys range from a tarnish to a heavy black scale. The black outer scale is cupric oxide (CuO) and the inner portion is probably the red cuprous oxide (Cu_2O). The pickle is usually a 10 per cent sulfuric acid solution, by volume, and is used at a temperature of

about 125°F . Red stains may result, and the surface may be dull. This can be remedied by a dip (100°F), directly after the pickling step, with a solution of the same acid strength, to which sodium chromate (0.5 lb./gal.) is added. Anhydrous ferric sulfate is substituted frequently because it is cheaper. If a smut remains, it can be removed by a bright dip. A *scaling* or *fire-off* dip is used after pickling and prior to bright dipping, so that a more uniform finish is obtained. A typical formula for this dip will consist of:

Sulfuric acid	2 gal.
Nitric acid	1 "
Water	5 "

The composition for a bright dip is:

Sulfuric acid	2 gal.
Nitric acid	1 "
Water	1 qt.
Hydrochloric acid	$\frac{1}{2}$ fl. oz.

The hydrochloric acid is added to increase the luster, while the nitric acid acts as an oxidizing agent, which aids in the removal of light tarnish, by attacking the copper alloy. Carbon (activated) is often added, especially when an excessive amount of hydrochloric acid is used. It tends to improve the operation of the dip. The carbon, it is believed, assists in obtaining a more uniform bright surface and also prevents a cloudy surface effect. After bright dipping and thorough rinsing in cold running water, articles may be dipped in a solution of sodium cyanide (4 oz./gal.) to remove stains.

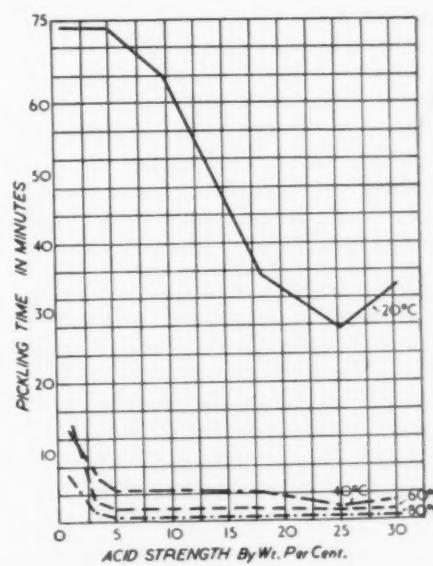


Fig. 124. Pickling times for cold rolled, close annealed, mild steel in sulfuric acid of different strengths.

Acid dips for zinc base alloys vary in time, concentration, and acid with different plants. In a survey, mentioned by *D. M. Overcash*, of eleven large companies that finish zinc base die castings, nine use sulfuric acid (0.2-3 per cent), two use phosphoric acid (3 per cent by volume) and one company also uses a citric acid solution (0.5-1 oz./gal.). The dips are used at room temperature and the time ranges from 10 to 60 seconds in automatic machines to 3 to 5 seconds for hand dipping. Another survey indicated the use of hydrochloric acid (2-10 per cent by volume) and hydrofluoric acid (1.5 per cent by volume). Bright finishes on zinc and zinc base alloys may be obtained by immersion in a solution of chromic acid (30-40 oz./gal.) and sodium sulfate (2-4 oz./gal.) at room temperature for 5 to 30 seconds. If a yellow film remains on surface, immersion in sulfuric acid (1 oz./gal.) will remove it.

Sheet aluminum, after an alkaline etch, is immersed for a few seconds in a nitric-sulfuric acid bright dip for smut removal. The composition of this bright dip is the same as that used for copper and copper alloys. Aluminum die castings (alloys) acquire a black or brown film during alkaline treatment. This is eliminated by immersion, at room temperature, for 15-30 seconds in a mixture of nitric acid (3 gal.) and hydrofluoric acid (1 gal.). Adequate ventilation is necessary.

Cleaner Evaluation

The effectiveness of alkaline metal cleaners has been evaluated by various methods. Such factors as highly standardized preparation of test panels (usually of steel) for soil application, and cleaning and rinsing conditions are important phases in procedure and methods of measurement of the residual soil on the test panel. Correlation between test and practice is emphasized in cleaner evaluation.

Some methods of evaluating alkaline cleaners yield results of a qualitative nature; others provide values based upon quantitative or semiquantitative determinations. Qualitative tests commonly used include: (a) *the wiping test*, in which the test panel soiled with mineral oil, carbon black, or a pigment is cleaned and rinsed, then wiped with white cloth or paper, and the cloth or paper is examined for residual soil; (b) *the oil spot test*, which consists of solvent degreasing (rinsing) of



Fig. 125. Cleaning Results. Left—Cleaning Index 73 (fair). Right—Cleaning Index 94 (good).

panel and evaporation of solvent on ground glass, where the residual ring is an indication of cleanliness; (c) *the water-break test*, which is based upon the principle that a metal surface free of dirt is uniformly wetted. This is considered a qualitative method for cleanliness evaluation, because the water-break pattern changes continuously as the excess of water drains from partially soiled metal surfaces. At the same time, evaporation of water from the clean areas introduces added difficulties in arriving at quantitative values.

SPRAY PATTERN:

In a modification of the water-break test, a procedure was introduced which gave a more sensitive test and furnished results which were of a quantitative nature. In this development, described by *S. Spring, H. I. Forman and L. F. Peale* in *METAL FINISHING* (1946), a mist or fine spray of water is directed against the metal surface to be evaluated. The mist collects on the soiled area in fine droplets, giving a soiled area (spray) pattern that remains constant for about 20 minutes, thus permitting a sketch to be made on paper divided into 100 squares. A quantitative determination is thus possible. The number of squares covered with water (no droplets) is called the cleaning efficiency index. This value is usually the average of five test panels (10 sides). Fig. 125 represents two such determinations.

ATOMIZER TEST:

In an effort to obtain a wettability test which is simple, inexpensive, and more sensitive than the water-break or spray pattern tests, *H. B. Linford and E. B. Saubestre* developed the atomizer test. An improvement which this procedure shows over the spray pattern test is in the complete drying of the panels at room temperature before the spraying operation. Areas which appeared clean by the water-break test appeared soiled when panels were dried before spraying with water. The spray

(atomizer) consists of a dilute solution of a blue dye. After spraying, the panel is dried with a photoflood lamp, which has the effect of freezing the pattern. The blue stain appears where water droplets are present. Areas which showed uniform water films will not show a stain because the solution is too dilute. Patterns are measured with a planimeter. The results of the tests may also be recorded by the sketch indicated in the spray-pattern method shown in Fig. 125. In sensitivity, as compared with the water break, the atomizer test was shown to be from about 10 times greater for oil films remaining after solvent treatment, to 160 times greater for oil residues left on metal surfaces after an alkaline cleaning process. An additional advantage claimed for this test is ease of performance, with little technical skill required. The test, when made for any oil on the test panel, reveals distribution of oil.

FLUORESCENT DYE TEST:

This method is based upon the fact that mineral oils and vegetable oils containing an oil soluble fluorescent dye will exhibit fluorescence when exposed to ultra-violet light. Residual oil (contaminated areas) on test panels will show a bright green color (glow) while the clean portion of the metal will appear black or dark, the shade varying with the filter used. The test was found to be next to the atomizer test in sensitivity, when a matte steel surface is used and the soil is lard or mineral oil.

RADIOTRACER METHOD:

The radioactive tracer method has been shown by *J. C. Harris* to give many times the sensitivity of such tests as water-break, fluorescence, and plating trials. It has the advantage over the atomizer test in the respect that this test has no limit of sensitivity, the degree depending entirely upon the improvement in technique and sensitivity of equipment. In addition, the tracer method permits rapid, quantitative measurements of small amounts of soil. A difficulty encountered, however, is the preparation of suitable tagged soil. Measurement for this method is made with a Geiger counter. *J. W. Hensley* and co-workers report in *METAL FINISHING* (1952) the use of radioactive stearic acid as a soil for metal cleaning tests. Results indicate that the procedure is relatively simple and reproducible. Distinct differences

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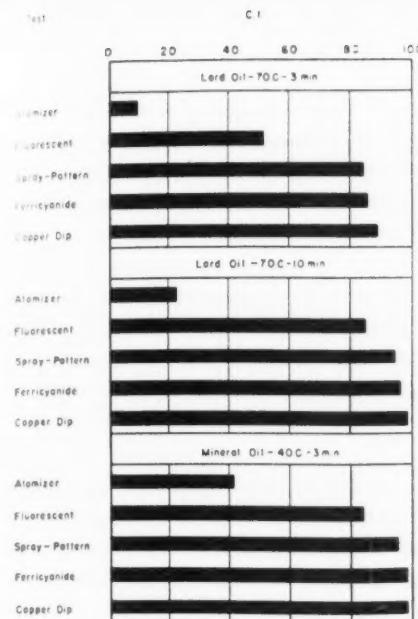


Fig. 126. Cleaning index results for various degreasing evaluation tests.

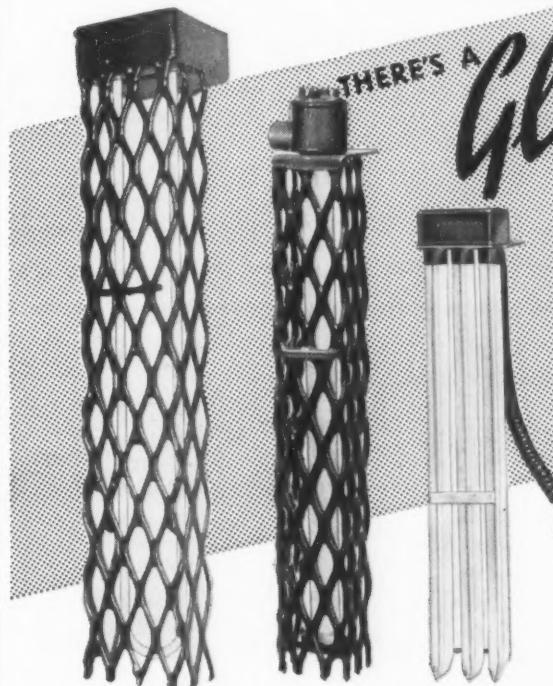
were found in the rate of soil removal and the amount of residual soil left by different cleaning solutions when used for still cleaning at 90°C.

CHEMICAL TYPES:

The chemical methods of alkaline cleaner evaluation testing include the copper-replacement (copper-dip) and the potassium ferricyanide methods. A steel panel, chemically clean, when immersed in an acid copper sulfate solution (62.6 g./l. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ + 17 g./l. H_2SO_4) will result in the deposition of a film of copper as a result of replacement of the iron at the surface. A clean surface will appear as a semi-bright light pink copper plate, free from spots and adherent to the steel. Copper will not coat oil globules (films) and will be non-adherent on oxide areas. This relatively simple method is quantitative since, after proper rinsing and drying, the areas covered by the immersion deposits of copper can be determined and used as a cleaning index (C.I.).

The potassium ferricyanide, $\text{K}_3\text{Fe}(\text{CN})_6$, paper test is based upon the reaction which produces a blue color when the paper coated with potassium ferricyanide is in contact with clean (ferrous) iron areas. Soiled surfaces will leave yellowish or colorless spots. As with the dip test, measurement of the blue pattern areas provides a cleaning index. The following procedure and proportions are recommended for the test paper in the report

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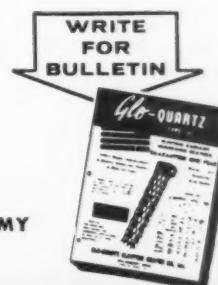
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of A.E.S. Project 12. The paper is prepared by coating one side first with a solution consisting of 50 g./l. each of gelatin and sodium chloride. Before making a test, the gelatin-coated paper is immersed in a solution consisting of:

Sodium chloride 50 g./l.
Potassium ferricyanide 100 "
Hydrochloric acid 1 "

The moist paper is placed over the steel test panel for about 3 minutes, removed and dried.

A quantitative study of the cleaning indices, based upon measurements using the atomizer, fluorescent, spray pattern, ferricyanide, and copper dip

tests, was made on panels prepared in the same manner. Three alkaline cleaning conditions were considered. Lard oil, as soil, was cleaned at 70°C. for 3 minutes and 10 minutes and mineral oil, as soil, was cleaned at 40°C. for 3 minutes. Results, as recorded graphically in Fig. 126, indicate clearly that lowest cleaning index value was obtained by the atomizer test. This value was followed, not too closely, by the fluorescent dye test. Results for the other tests were higher. Thus, soiled areas, remaining after alkaline cleaning, are detected most readily by the atomizer test. It ranks in sensitivity with the radioactive tracer test.

SHOP PROBLEMS

ABRASIVE METHODS SURFACE TREATMENTS CONTROL
ELECTROPLATING CLEANING PICKLING TESTING



METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Silicates in Cleaners

Question: I have been told that an alkali cleaner containing silicates should not be used for cleaning stainless steel prior to chromium plating. Do you know of any reason why silicates, either in an alkali soak or electrolytic cleaner, would not be desirable?

P. B. G.

Answer: There is no objection to using silicates in either soak or electrolytic cleaners. As a matter of fact, these compounds are very commonly employed for the purpose.

When using silicates, it is important to rinse very thoroughly since any residual silicate, if carried into the subsequent acid solution, will precipitate as silicic acid and give rise to pitting.

Wetting Agent for Chromic-Phosphoric Strip

Question: In the GUIDEBOOK-DIRECTORY for 1949, page 196, in an article by N. Hall, G. B. Hogboom, Jr., and J. B. Mohler, concerning stripping of anodized aluminum films by chromic-phosphoric acid, there was mentioned the use of a "suitable wetting agent—.08 oz./gal." Can you tell us what this "suitable wetting agent" is?

B. H. A.

Answer: The newer types of fluorocarbon wetting agents, which are highly resistant to oxidizing agents, and have been employed for spray elimination in chromium plating solutions, are quite suitable for the chromic-phosphoric strip.

A list of suppliers of spray eliminators will be found on page 566 of the 1956 edition of the METAL FINISHING GUIDEBOOK.

Gold Engraved Guns

Question: I would like information on plating engraved figures with gold on blued gun parts and receiver. Can you send me information on the subject, bearing in mind that I know nothing of said subject.

F. O.

Answer: To produce the gold plating in the engraving of the guns, stop-off all but the area to be gold plated. Then clean, nickel and gold plate as usual. The nickel and gold are removed from the highlights with a hard felt wheel or a belt sander with a metal platen. The gun can then be blackened as usual by the caustic black process without affecting the gold in the recesses.

Instead of stopping-off the parts which are to remain black, you might find it more practical to apply the nickel and gold to the engraved areas by brush plating.

Stripping Chromium

Question: Popular Mechanic magazine has referred us to you. We have a small shop where we do our own polishing of copper and brass and we are having difficulty getting chrome off. We use a bright dip and this does not remove it. We have been told a 6 volt battery charger would remove it, but we do not know how to use it. What solution do we use, and how strong and should it be hot or cold?

P. M.

Answer: Chromium will dissolve very rapidly in concentrated muriatic acid. However, the underlying nickel plate will not be removed in this acid.

To remove both nickel and chromium, the article is made the positive electrode at 6 volts in a cold solution

of 3 gallons sulfuric acid and 2 gallons water. A piece of lead is connected to the negative terminal of the power source. A battery charger will not give sufficient amperage for this process since about 100 amperes per square foot will be drawn at the start. You can use a heavy duty storage battery, however, and use the charger for recharging the battery.

Plating Powder Compacts and Stop-Off for Carburizing

Question: Would you kindly supply such information as you may have on the following subjects:

1. Recommended impregnation material and cyanide cadmium barrel plating process operations for small sintered iron powder compacts.
2. Recommended bath formulation and thickness requirements for cyanide copper barrel plating of small parts as a stop-off for selective carburization.

Our problem in request number one is that of eliminating discoloration of the cadmium plate a day or two subsequent to parts processing.

Problem number two appears to be one of the control of small blisters and porosity.

R. L. F.

Answer: Good results have been obtained when plating sintered iron powder compacts with cadmium by solvent degreasing and cadmium plating without any further cleaning or pickling operations. There is no standard impregnating material for the purpose, these ranging from waxes to resins of various kinds. A chromate type conversion coating process after plating will aid in controlling the condition and the importance of clean rinse water and thorough rinsing must not be ignored.

Any high speed cyanide copper bath is suitable for use in stopping off for case hardening. A thickness of 0.0005" minimum is required for a case of 0.010" but, more important, the solu-

tion must be absolutely clean so that a non-porous copper deposit is obtained. The pyrophosphate copper solution can also be used if the cyanide bath is undesirable. Blisters and porosity are often due to improper cleaning and pickling.

Corrosion of Stainless Knife Blades

Question: For a few months one of my customers has had some difficulties with knife blades of stainless steel (Cr-14%; C-0.35%). After use, sometimes as short as a few days, these blades show a few black spots of corrosion. This corrosion is not general, but appears only on some of the blades.

L. L.

Answer: Black corrosion spots on stainless steel knife blades may be due to specks of iron forced into the material during the press operation or to iron in the buffing and polishing compound.

After polishing, the blades should be cleaned and then soaked for a few hours in a 20% solution of nitric acid containing about 2 oz./gal. potassium dichromate in order to dissolve out the iron and to passivate the surface.

Conductivity of Silver

Question: I have been told that bright silver baths produce deposits which have more electrical resistance than plain silver. I would appreciate your opinion in this matter.

D. M.

Answer: There is no measurable difference in the electrical conductivity of bright and matte silver deposits. Bright silver deposits are also harder and will give better wear resistance; therefore, they are more desirable than dull silver deposits.

Small Scale Plating

Question: I noticed under "Shop Problems" of the May, 1956 issue an inquiry by C. W. D. regarding using an automobile generator for small scale plating. Do you give out the names and addresses of people making such inquiries? If so, could you favor me with this information? I would like to contact this party. If not, can you give me more information on use and hook-up of the generator.

B. A. M.

Answer: The wiring hookups for plating tanks will be found on pages 74-7 of the 1956 edition of the METAL

FINISHING GUIDEBOOK. The third brush on the old generators goes to the generator field and changing the position of the brush on the commutator varies the voltage delivered. On the newer two brush generators a rheostat is used, as shown on page 74. A coil of baling wire can be used for the rheostat with a battery clamp to attach the lead to any point on the coil for control.

Bright Stripping

Question: In the preparation of gold and silver jewelry stampings for the application of vitreous enamels, we have been making the articles anodic at 6 volts in a solution of sodium cyanide and potassium ferrocyanide for gold and sodium cyanide and a small

amount of boric acid crystals for silver. To get good results as to color, particularly with transparent enamels, these metals need to have all fire removed and be bright. The above solutions do not work too well and it may be that we are not using the right proportions. We would appreciate your suggestions.

W. J. B.

Answer: Prior to using the "bright strips" for gold and silver, the fire scale should be removed with acid. A hot 10% by volume solution of sulfuric acid is suitable for both metals. Nitric acid can also be used for silver. The "gold strip" solution will give better results at 12 volts and high temperature.

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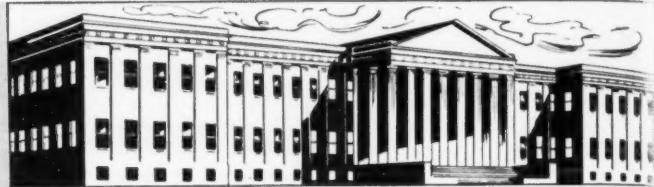
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Patents

RECENTLY GRANTED PATENTS IN THE METAL FINISHING FIELD



Polishing Wheel and Abrasive Applicator

*U. S. Patent 2,764,856. Oct. 2, 1956.
W. L. Steen and C. E. Steen.*

A polishing wheel and abrasive supply system therefor comprising, a fluid motor and displacement pump interconnected mechanically for movement of said pump in proportion to movement of said motor, a source of fluid pressure connected to said motor, a volume control valve connected between said source and said motor, a hollow rotatable spindle having a series of spirally arranged ports formed through its wall, a multiplicity of flexible discs disposed around said spindle over said ports and clamped axially together, a plurality of rigid spacer discs of smaller diameter than said flexible discs and interposed between axially spaced flexible discs, said rigid discs having radially extending grooves formed in the faces thereof, a delivery conduit having a running seal connection to said spindle to deliver abrasive to the interior thereof, and means connecting said pump between said delivery conduit and a source of abrasive.

Liquid Buffing Composition

*U. S. Patent 2,765,223. Oct. 2, 1956.
E. T. Candee and S. L. Doughty, assignors to The Lea Manufacturing Co.*

A liquid buffing composition consisting essentially of 2½% to 10% by weight of a non-jelling liquid glue, 5% to 10% by weight of diethylene glycol, 2% to 10% by weight of a grease selected from the group consisting of the higher fatty acids, their glycerides, their ester waxes, and petroleum waxes, ½% to 3% by weight of a non-jelling, non-ionic surface-active emulsifying agent, from 45% to 60% by weight of a finely-divided abrasive, and the balance from 15% to 40% by weight of water, said composition being characterized by being free-flowing and forming a stable emulsion from which the water content need not be volatilized completely before buffing takes place.

Protective Coating

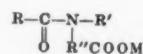
*U. S. Patent 2,765,237. Oct. 2, 1956.
F. E. Drummond, assignor to Midland Chemical Corp.*

A protective metal coating composition which is resistant to abrasion and atmospheric conditions conducive to corrosion, which is composed of finely divided zirconium metal particles dispersed in liquid sodium silicate, said zirconium metal particles being of a particle size such that approximately 80% passes a 200-mesh screen and the same is mixed with sodium silicate in the proportionate amounts in parts by weight of between about 60-120 parts zirconium metal and 20-40 parts sodium silicate, the resultant composition being adapted to be applied to a metal surface to form on baking at a temperature of 200-300°F. a continuous, hard, tenacious adherent protective coating film thereover.

Bright Gold Bath

*U. S. Patent 2,765,269. Oct. 2, 1956.
B. D. Ostrow and F. I. Nobel.*

In a bright gold plating bath consisting essentially of gold cyanide and free alkali metal cyanide in water solution, the improvement which comprises the addition to said bath of a condensation product of a fatty acid having 8 to 18 carbon atoms with an amino acid and having the following structural formula:



wherein M represents a radical taken from the class consisting of hydrogen and alkali metal, R represents an alkyl radical having 7 to 17 carbon atoms, R' represents a radical taken from the class consisting of a lower fatty acid, an alkyl monoalcohol, ester thereof, ether thereof, the alkyl radicals of which have 1 to 3 carbon atoms and hydrogen, and R'' represents a radical taken from the class consisting of methylene, ethylene and propylene, the amount of said reaction product being from 1 to 100 gms./liter, together with

the water soluble salts of nickel and tin in sufficient amount to exert a brightening effect on the plated gold.

Electrolytic Cleaning Method

*U. S. Patent 2,765,271. Oct. 2, 1956.
J. F. Kreml, assignor to Armco Steel Corp.*

A method of cleaning a weld-discolored stainless steel workpiece, comprising moving an electrically-conductive electrode bodily across the workpiece in the region of the weld with the interposition therebetween of electrolyte comprising approximately 20% to 100% by volume of a water solution of phosphoric acid of about 70% to about 85% concentration, and impressing thereacross an alternating current of about 60 cycles per second operating at voltage ranging from about 4 to about 24 volts and at high current density.

Corrosion Preventive

*U. S. Patent 2,765,289. Oct. 2, 1956.
E. K. Fields and R. W. Watson, assignors to Standard Oil Co.*

A new composition of matter, the reaction product of an aromatic nitrogen compound selected from the class consisting of a thiodiarylamine and a diarylamine, an aldehyde having from 1 to about 24 carbon atoms and 2,5-dimercapto-1,3,4-thiadiazole, said reaction product having anti-oxidant and corrosion inhibiting properties and being suitable for addition to oils to impart oxidation and corrosion inhibiting characteristics thereto, said reactants being reacted in the molar proportions of from about 1:1:1 to 4:4:1, respectively, at a temperature of from 25°C. to about 100°C.

Automatic Buffing Machine

*U. S. Patent 2,765,590. Oct. 9, 1956.
S. Belejach and N. Feingold, assignors to National Silver Co.*

In a buffing machine, the combination of a frame, an endless conveyor chain comprising a plurality of links pivotally interconnected alternately on

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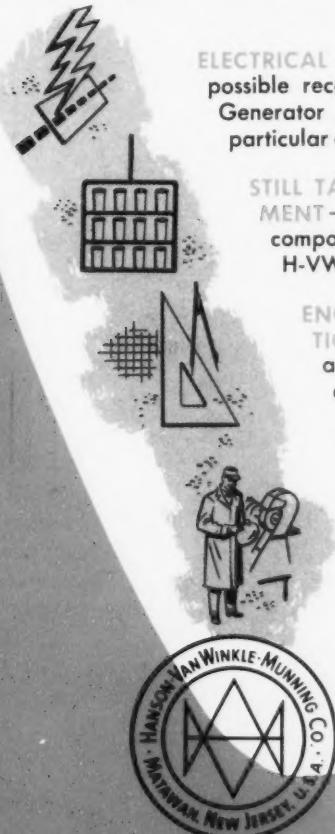
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Aluminum

anodizing, buffing and cleaning

No matter what your aluminum finishing problem or need, you'll find the answer at **H-VW-M...** because it is the one company combining a complete engineering service with a complete line of equipment and supplies!



ELECTRICAL EQUIPMENT — Want the best possible recommendation of a Rectifier . . . Generator . . . or Control Equipment for your particular operations? Page 2 tells how to get it.

STILL TANK OR FULL AUTOMATIC EQUIPMENT — Whatever your need—from a single component to a complete, integrated system—H-VW-M supplies it . . . Page 3.

ENGINEERING SERVICE AND INSTALLATION — H-VW-M engineers and technicians are anodizing equipment specialists, with years of experience. Page 3 tells why these H-VW-M services mean greater efficiency and savings in your plant.

ALUMINUM FINISHING SUPPLIES — Page 4 shows how H-VW-M research has resulted in new compounds, improved buffs and cleaners to make aluminum finishing easier, better.

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MATAWAN, NEW JERSEY

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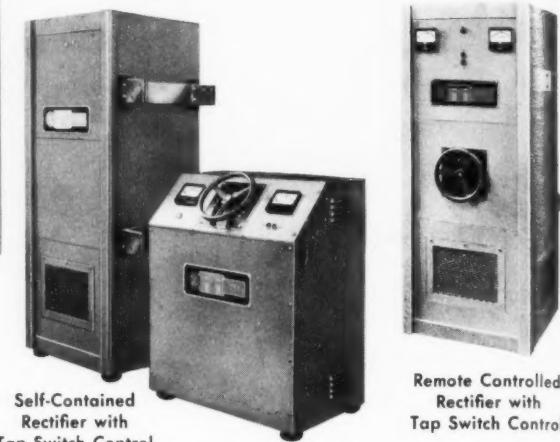
These H-VW-M Anodizing and Finishing to New Savings, New Efficiency, New

ELECTRICAL EQUIPMENT

H-VW-M is the only manufacturer of both Germanium and Selenium Rectifiers and low voltage, direct current Motor Generator Sets for the metal finishing industry. This thorough experience in every phase of low voltage power generation and rectification means that when you bring your power problems to H-VW-M you're sure to get the perfect equipment recommendation.

Germanium and Selenium Rectifiers . . . Rectifier Controls

Highest quality and efficiency, flexibility, economy and low maintenance are the characteristics combined in H-VW-M's full line of both Germanium and Selenium Rectifiers. 6 to 48 volt units—both remote and self-contained—provide the exact direct current low-voltage and high amperage required in aluminum anodizing. The widest possible choice of controls and control combinations is available. Such devices as manual or motor operated tap switch controls, continuously variable auto-

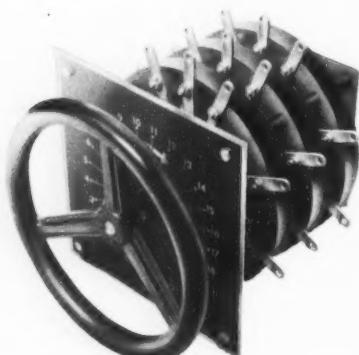


Self-Contained Rectifier with Tap Switch Control

Remote Controlled Rectifier with Tap Switch Control

transformers and saturable core reactors are used with or without supplemental controls to provide automatic voltage stabilization, automatic constant current as well as automatic programming.

Write for Bulletin ER-108, which gives further information about Rectifiers and Controls, plus useful control application suggestions.



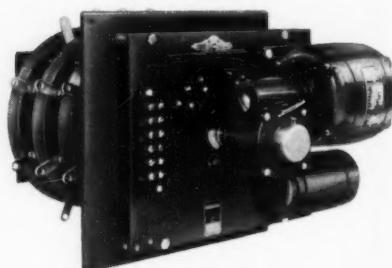
Manual Tap Switch Control



Saturable Core Reactor



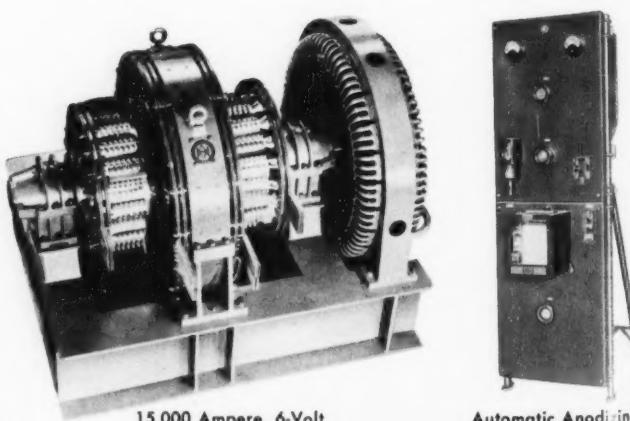
Continuously Variable Auto-Transformer



Motor Operated Tap Switch Control

Generators . . . and Controls

H-VW-M Motor Generators designed especially for metal finishing operations are built in sizes up to 50,000 amperes, and accessory equipment includes a full line of controls and control panels to cover any desired control function. Easy-to-maintain H-VW-M Motor Generators have exceptionally rugged and practical construction features insuring maximum performance and life. Standard voltage ratings range from 6 to 50 volts, and include the 18 and 24 volt units usually required for sulphuric acid anodizing, plus the 40 and 50 volt units used in chromic acid anodizing. Write today for 24-page Bulletin G-104, covering in detail all H-VW-M Generators.



15,000 Ampere, 6-Volt Generator Unit



Automatic Anodizing Control Panel

Supplies, Equipment and Services Add Up Simplicity of Operation in Your Plant

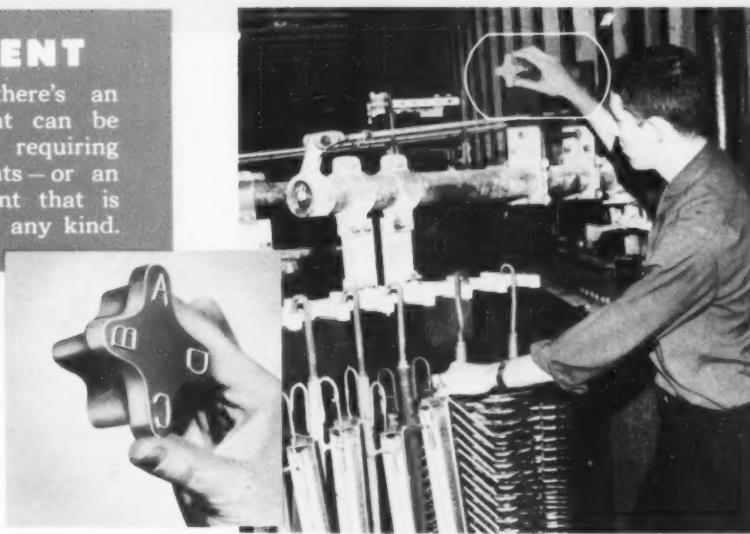
PROCESSING EQUIPMENT

Whatever your anodizing procedure, there's an H-VW-M Full Automatic Conveyor that can be adapted to any production application requiring automatic cycling of individual treatments—or an H-VW-M Tank with accessory equipment that is perfectly adapted to still tank methods of any kind.

Automation in Metalfinishing— Full Automatic Conveyors with Dial-A-Cycle

H-VW-M's new DIAL-A-CYCLE system automates nine or more complete metalfinishing processes on a single anodizing or electroplating machine. This revolutionary by-pass mechanism can be used on any metalfinishing installation for anodizing, electroplating, or similar processing. It is especially useful and effects substantial cost reductions when a variety of parts requires several different processes or colors.

DIAL-A-CYCLE, as the name implies, is controlled by a simple dial setting. The dial is mounted on the carrier arm that carries the parts through processing tanks. It is set by the machine operator for the processing steps through which each load of unfinished parts is to move. Automatic conveying then takes over, lowering



Workman "dials" desired cycle in refrigerator plant. Parts will by-pass or lower into baths as dial setting dictates.

the parts into the required tanks and bypassing others.

Different products, requiring different anodizing cycles, may be processed at the same time, with the same equipment. DIAL-A-CYCLE gives you new versatility while reducing operating, labor, and maintenance costs. Close, automatic control of transfer and immersion periods improves quality.

DIAL-A-CYCLE is the newest of many types of conveyors and equipment H-VW-M supplies to aluminum finishers. H-VW-M also designs, manufactures, and installs return-type conveyors . . . elevator conveyors . . . straight-line conveyors . . . and others. For a complete description of all types, write for Bulletin FA-105.

Tanks and Equipment

At H-VW-M—the plating and anodizing industry's workshop—you'll find tank equipment for every phase of your work. For chromic acid anodizing, H-VW-M double electric welded unlined steel tanks are offered, along with steel coil equipment for cooling and heating. The entire system is H-VW-M designed, supplied and installed. For sulphuric acid anodizing, lead-lined steel tanks, plus the necessary cooling coils and air agitation

assembly, are supplied. Tanks are fabricated from hot rolled steel, stainless steel, and aluminum. Other types of tanks are also available. Bulletin No. T-108 gives full particulars about this important H-VW-M equipment. Every conceivable type of auxiliary equipment is engineered and supplied, according to customers' specifications, including a complete packaged refrigeration system for anodizing solutions.

And H-VW-M's Engineering and Installation Service

Anodizing problems of any kind? H-VW-M is prepared to set up your entire anodizing system from beginning to end—a system made up of components scientifically engineered to work together with utmost efficiency. Because of this, and because of H-VW-M's continuing research and development in every aspect of the anodizing picture, you can be confident that the recommendation you receive from H-VW-M is the very best.

What's more, if requested, H-VW-M sees to it

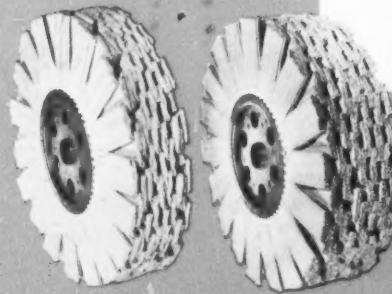
that the equipment you buy is H-VW-M *installed*. This means perfect, efficient operation from the start.

Add to this the fact that an H-VW-M technical representative—ready to serve you—is no further than your telephone. These representatives serve in principal cities across the nation. Get to know the one nearest you. He can help you get the most from your aluminum finishing equipment and supplies.

TURN THE PAGE FOR ALUMINUM BUFFING AND CLEANING SUPPLIES

ALUMINUM BUFFING AND CLEANING SUPPLIES

Since aluminum came into its own after World War II, considerable H-VW-M research and development work has been devoted to the perfection of buffs and compounds suiting the unique physical characteristics of this popular light metal. When long-wearing H-VW-M Buffs are used in conjunction with H-VW-M compounds especially formulated for aluminum finishing, you have the perfectly balanced combination for economy, efficiency and quality performance.



Whether you're looking for a super-heavy-duty buff like new steel-centered Ruff-L-Buffs (which are available untreated, or Binderized® for extra long wear) medium duty buffs like Triplex Buffs, or a buff for medium-to-light service such as the Full Disc Buff, you need look

Buffs

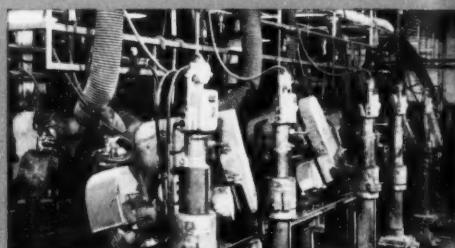
Nowhere will you find a wider selection of the buffs you need for preanodizing operations than at H-VW-M.

no further than H-VW-M. The full H-VW-M line also includes new Tufta-Flex Buffs (cloth tufts) and Sisal-Flex Buffs (with sisal-centered tufts).

Among this array you'll find the exact buffs for your aluminum finishing needs. Every one is characterized by first quality, uniform new material of close weave and good weight . . . tight sewing with heavy thread . . . and proper balance. Write for 12 page Bulletin B-103, which describes H-VW-M's entire buff line.



Hand buffing using H-VW-M buffs, compounds.



Automatic buffing by means of H-VW-M Liquimatic System.

Compounds

For heavy duty cutting, H-VW-M Liquid Tripoli Compounds 303 and 420 were developed, and are now widely used in the cooking utensil industry. For the appliance, storm window, construction materials and automotive fields, H-VW-M's new Liquimatic Liquid Compound No. 728 has proved especially successful, giving excellent cut, while leaving the surface with deep, high color.

H-VW-M Bar Compounds also find broad use in aluminum finishing. A variety of tripoli bar compounds

are offered in varying consistencies to meet all cutting requirements. For cut and color, special white compounds are available. And for high color, several new H-VW-M aluminum oxide compounds—No.'s 6-B-168, 6-B-72 and 8390—give unusually good results. Write for Bulletin CO-103.

Cleaners

H-VW-M devotes constant research to the subject of cleaners in its search for ever better products in the aluminum finishing field.

Matawan Cleaners are designed specifically to give superior results in soak cleaning, power spray operations, oxide removal, and for special aluminum cleaning and etching operations. Of particular interest is H-VW-M's 85S Cleaner, which prevents scale formation, thus keeping coil and tank walls scale free. This unusual aluminum cleaner leaves an extremely bright surface, and, because of its built-in regenerator, makes maximum effective use of caustic in the bath.

In line with its desire to supply the exact cleaner for the job, H-VW-M offers its extensive laboratory facilities where circumstances demand a special cleaner.

- When you think of aluminum finishing equipment and supplies—think of H-VW-M first.
- Buying from one dependable source . . .
- H-VW-M . . . means one company assumes full responsibility—your guarantee that you're getting the best . . . in products . . . in performance, in extra service.

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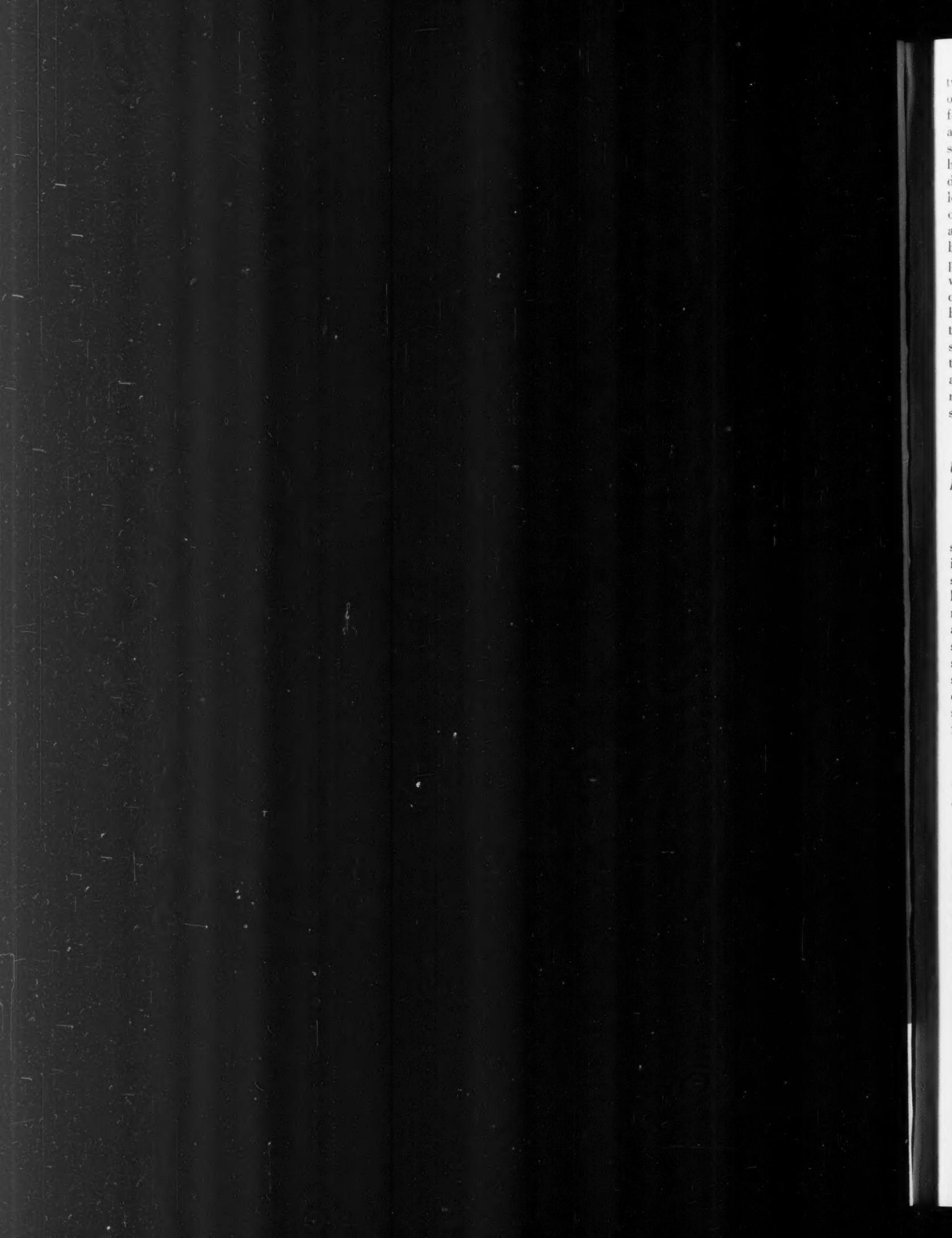
INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES

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two axes, one at right angles to the other and having suspending means for the articles to be polished, plurality of alternate higher and lower sprockets journaled on the frame on horizontal axes, and a buffing station disposed substantially centrally of each lower sprocket and comprising a pair of juxtaposed, buffing drums journaled on substantially horizontal axes between which the articles to be buffed pass in a downwardly and then upwardly inclined path, thus presenting continually varying work surfaces to be buffed by the drums, means for rotating the drums oppositely, corner sprockets for the chain journaled on the frame on axes disposed at right angles to the lower sprockets and means for driving at least one of the sprockets.

Belt Contact Wheel

*U. S. Patent 2,765,594. Oct. 9, 1956.
F. E. Hendrickson, assignor to Murray
Ireland.*

A belt-backing contact wheel for surface-finishing operations including in combination, a plurality of flexible sections each including a piece of heavy sheet material having a pair of mounting holes near one edge thereof, a wheel hub having circumferentially spaced members extending through said holes and supporting said flexible sections thereon with said one edge of each section innermost so that said sections extend out generally radial from said members and said hub.

Vacuum Metalizing

*U. S. Patent 2,767,105. Oct. 16, 1956.
J. Fletcher, assignor to National Re-
search Corp.*

A method for producing an article having a lustrous diffuse appearance with a physically smooth surface which comprises the steps of applying to an article a base resin containing a dispersed solid, the weight of said dispersed solid being at least 40 per cent of the weight of the resin vehicle on a dry basis, completely curing the base resin to provide a gas-free matte surface, depositing aluminum on said matte surface by vacuum deposition to provide a diffuse aluminum finish, applying a clear resin over the vacuum-deposited aluminum coating, and drying said clear resin coating to provide a smooth protective surface over said diffuse aluminum finish.

Photosensitive Anodized Aluminum

*U. S. Patent 2,766,119. Oct. 9, 1956.
M. L. Freedman and M. A. Levitin,
assignors to Horizons, Inc.*

The method of producing an aluminum base photographic plate capable of being stored in darkness without fogging of its photosensitive element and further capable of being developed by conventional photographic procedure, said method comprising impregnating the pores of an anodically oxidized surface of a metallic aluminum base element with an aqueous solution of a silver salt further containing a minor amount but between at least about 0.1% and about 2% by weight of an organic hydrocolloid, so as to uniformly distribute said aqueous solution throughout the pores of the oxide coating, bringing the thus-impregnated oxidized surface of the base element into contact with an aqueous solution of an alkali metal halide with the resulting formation of the corresponding silver halide in situ in said pores and distributed throughout said pores, thereafter washing the thus-treated oxidized surface to remove any residual solution from the oxide pores, and drying the washed surface of the aluminum base element, all of said steps being carried out in the absence of light which would reduce the silver compound to metallic silver.

Electroless Nickel

*U. S. Patent 2,766,138. Oct. 9, 1956.
P. Talmey, assignor to General Ameri-
can Transportation Corp.*

The process of chemically plating with nickel a catalytic article essentially comprising an element selected from the group consisting of copper, silver, gold, aluminum, iron, cobalt, nickel, palladium and platinum; which process comprises contacting said article throughout a time interval with an aqueous bath comprising nickel ions and hypophosphite ions, and regenerating said bath only with nickel hypophosphite and another soluble hypophosphite and a soluble alkali, said other hypophosphite being selected from the group consisting of hypophosphorous acid and alkaline hypophosphites, thereby to minimize the introduction of extraneous ions into said bath and the consequent build-up of undesirable salts therein incident to the regeneration thereof.

Phosphate Conversion Coatings

*U. S. Patent 2,766,153. Oct. 9, 1956.
W. S. Russell, assignor to Parker Rust
Proof Co.*

A composition for coating a metal of the class consisting of mild steel, zinc and aluminum, comprising an aqueous acidic solution consisting essentially of phosphoric acid, water and a substituted heterocyclic amine phosphate having the structure:



wherein R is a substituent selected from the group consisting of hydrogen and hydrocarbon radicals having less than 7 carbon atoms and of the group consisting of alkyl, aryl and cycloalkyl, the pH of the solution being between about 3 and 6, said solution containing at least .01% phosphate ion.

Phosphate Conversion Coatings

*U. S. Patent 2,766,154. Oct. 9, 1956.
W. S. Russell, assignor to Parker Rust
Proof Co.*

A composition for coating a metal of the class consisting of mild steel, zinc and aluminum comprising an aqueous solution consisting essentially of phosphoric acid, water, and a substituted heterocyclic amine phosphate having the structure:



wherein R is a ring substituent selected from the class consisting of hydrogen and hydrocarbon radicals having less than 7 carbon atoms and of the group consisting of alkyl, aryl and cycloalkyl, the pH of the solution being between about 3 and 6, said solution containing at least .01% phosphate ion.

Plating Method

*U. S. Patent 2,766,194. Oct. 9, 1956.
A. J. Certa, assignor to Philco Corp.*

The method of electrolytically treating electrically conductive ferromagnetic articles, which comprises, subjecting the articles to an electrolytic operation while carried by magnetic supporting means upon which is provided a layer of loose electrically conductive ferromagnetic particles disposed to ensure a conductive path between said articles and said supporting means.

Plated Aluminum Bearings

*U. S. Patent 2,766,195. Oct. 9, 1956.
E. L. Combs, C. L. Faust and G. R.
Schaer, assignors to American Brake
Shoe Co.*

A method for producing tin-lined bearings having an aluminum-containing bearing shell comprising, subjecting the bearing shell to a cleaning step to remove dirt scums and the like, dipping the cleaned shell in a relatively weak sulfuric-oxalic acid solution comprising a 10% sulfuric acid solution containing from about one-half to ten ounces per gallon of oxalic acid for a period of time not substantially more than about five minutes and at an elevated temperature not substantially below 100°F. to remove all traces of aluminum oxide from the surface of the shell, thereafter electroplating the oxide-free surface of the shell with a copper lining of a thickness not substantially less than 0.0001 inch or substantially more than 0.002 inch to protect the oxide-free surface against further oxidation, and thereafter applying a tin lining to said copper lining hav-

ing a thickness not substantially less than 0.0005 inch or substantially more than 0.001 inch to provide said bearing shell with a tin bearing lining.

Iron-Chromium Bath

*U. S. Patent 2,766,196. Oct. 9, 1956.
T. Yoshida.*

An electrolytic process for the electro-deposition of an iron-chromium alloy wherein an aqueous solution is used which contains per liter from 10 to 63 grams of trivalent chromium, from 5 to 40 grams of divalent iron, from 100 to 264 grams of free urea and an amount of sulfate radical at least stoichiometrically equivalent to the total content of trivalent chromium and divalent iron contained in said solution, said trivalent chromium having a weight ratio to said divalent iron of more than 1.3, the molecules of said free urea existing in said solution substantially without formation of complex ions therefrom, said solution having attained an equilibrium with respect to complex ions contained therein by having been kept at a constant temperature between 25° and 55°C.

Cleaning Magnesium Castings

*U. S. Patent 2,766,199. Oct. 9, 1956.
W. F. Higgins, assignor to Magnesium
Elektron, Ltd.*

A method of cleaning castings of magnesium base alloys having mould contaminants in the surface thereof which comprises removing said mould contaminants thereon by subjecting the said casting to anodic treatment whilst immersed in an aqueous solution consisting of ammonium fluoride, said ammonium fluoride being selected from the group of fluorides consisting of NH_4F and $\text{NH}_4\text{F} \cdot \text{HF}$, said aqueous solution containing in quantity at least two per cent ammonium fluoride by weight of the water.

Barrel Plating Cylinder

*U. S. Patent 2,766,201. Oct. 9, 1956.
E. W. Luther, assignor to Underwood
Corp.*

In electroplating equipment for use in a process wherein a tumbling drum contains an electrolyte and has cathode means, and a first batch of metallic articles is loosely confined and tumbled

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* ALL-PURPOSE BUFFING COMPOUNDS * WHITE COLORING COMPOUNDS * NICKEL BUFFING
(LIME) * EMERY CAKE * PLASTIC BUFFING COMPOUNDS * TALLOW GREASE STICK
* PUMICE GREASE STOCK * POLISHING WHEEL CEMENT * STEEL POLISHING COMPOUNDS

COMPOUNDS MADE IN BAR, SPRAY OR PASTE

in the electrolyte in said drum in contact with said cathode means for plating, the combination with said drum of an auxiliary container loosely confined in the drum for tumbling together with said first batch of articles in said electrolyte in contact with said cathode means, said container comprising a body having porous walls of dielectric material for passage of electrolyte therethrough, said walls defining an outer surface and enclosing a hollow interior for loosely confining a second batch of articles, a multiplicity of separate electrically conducting elements fixed to and passing through said walls from the outer surface of said body adjacent the first batch of articles, into said hollow interior adjacent the second batch of articles, said conducting elements being held substantially uniformly spaced throughout the entire outer surface and interior of said body, and means for opening said body, whereby the second batch of articles may be inserted or withdrawn from said container and whereby said first and second batches are separated from

each other although plated together in said drum.

Sand Blasting Apparatus

U. S. Patent 2,766,557. Oct. 16, 1956.
G. M. Pollard.

Abrasive blast surface-treating apparatus comprising an open-ended hood, air-impermeable sealing means projecting outwardly from said open end for sealably engaging said hood with a surface to be treated, a nozzle mounted in the closed end of the hood and directed substantially axially of the hood for projecting a blast pattern centrally therethrough toward said open end, and reduced pressure discharge means communicated with said hood proximate to said open end sealing means, said closed end hood portion being provided with air-inlet openings radially spaced from said nozzle for admitting air into said hood concentrically about blast pattern, said admitted air forming an air stream capable of flowing into said discharge means in substantially the same general

direction as blast particles rebounding from said treated surface.

Apparatus for Mixing an Abrasive Powder with a Gaseous Carrier Under Pressure

U. S. Patent 2,766,558. Oct. 16, 1956.
R. B. Black.

A device for mixing an abrasive powder with a gaseous carrier under pressure comprising a valve housing member having a conduit extending therethrough; an adjustable choke in the conduit; a connection for supplying the gaseous carrier to one end of the conduit; a connection for discharging the mixture from the other end of the conduit; an abrasive powder reservoir carried by said valve housing member; a passageway connecting the reservoir with the conduit on the inlet side of said choke; a passageway connecting the bottom portion of the reservoir with the conduit on the discharge side of said choke; all of said parts being constructed and arranged for movement as a unit; a plate flexibly



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COMPOUNDS MADE IN BAR, SPRAY OR PASTE

supporting said unit; said valve housing member being provided with an arm extending outwardly in proximity to said plate; and means for vibrating the unit, said last means including a coil and a cooperating armature, one of which is carried by the arm and the other, by the plate, together with means for supplying a pulsating current to the coil.

Drum-Type Pickling Machine

U. S. Patent 2,766,562. Oct. 16, 1956.
O. Ruthner.

An improved drum-type pickling apparatus for removing rust and scale from coiled strips of metal, which comprises a horizontally disposed drum including two drum end walls and a drum shell projecting at both ends beyond the end walls, the projecting portions of said drum shell forming rims at the ends of said drum, at least three rollers for rotatably supporting said drum, said rollers operatively being disposed within the edges of said shell with the upper portions of the

shell rims resting on the peripheries of said rollers, means for driving at least one of said rollers, and pivotally mounted means journally at least one of said rollers whereby such roller is pivotally movable into or out of the range of rotation of the drum.

Sealing Anodized Aluminum

U. S. Patent 2,767,134. Oct. 16, 1956.
K. Hampel, assignor to Jervis Corp.

Process of sealing aluminum oxide coatings on aluminum or aluminum alloys which comprises heating an article having an electrolytically produced aluminum oxide coating for about fifteen minutes in an aqueous solution of sodium nitrite within a temperature range of from about 160°F. to below the boiling point of said solution.

Power Brushing Machine

U. S. Patent 2,767,413. Oct. 23, 1956.
W. G. Herrington, assignor to The
Fuller Brush Co.

Apparatus for removing scale from a face of a longitudinally extending thin sheet of steel which apparatus

comprises in combination, means for engaging the said sheet and for advancing it longitudinally along a fixed path, said means including an elongated frame arranged to pass the advancing sheet therethrough from end to end and also including a base plate carried by said frame and arranged to support the sheet in a substantially horizontal position, a plurality of similar elongated cylindrical brushes mounted on said frame in longitudinally spaced and transversely offset positions for simultaneous engagement respectively with a plurality of transversely narrow and transversely offset overlapping longitudinal zones of the said face of the sheet which brushes have radial metallic fibers and are rotatable about substantially horizontal axes which extend within a range of 0° to approximately 5° to the direction of longitudinal movement of the sheet, the axes of adjacent brushes being transversely offset to an extent within the approximate range of 4% to 7% of the diameter of the brushes, and drive means for rotating said brushes.



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COMPOUNDS MADE IN BAR, SPRAY OR PASTE

ABSTRACTS

Black Oxide Treatments on Steel

W. Hofmann: *Metallwarenindustrie und Galvanotechnik*. Vol. 45, No. 9, p. 432.

The black oxide treatment is suitable for all the commercial iron and steel alloys, stainless steel cannot be treated by the process but a straight nickel-steel can. The treatment can also be given to parts which are subsequently phosphated. The boiling point of the solution lies at 138°C. Correct bath composition will keep the boiling point at this figure; if it is lower, a longer processing time will be required. The immersion times for this bath are 5-10 minutes for a blackening; 15 to 20 minutes for a pleasing deep black color; 25 to 30 minutes for good corrosion and wear resistance; and 35-45 minutes for special requirements.

Full details are given of the equipment and layout required to operate this black oxide treatment process. Electric heating of the black oxide treatment tank has been found to give good results and is usually preferred.

Analysis of Nickel Baths

M. Straschill: *Metallwarenindustrie und Galvanotechnik*. Vol. 45, No. 10, p. 494.

The approximate nickel content of simple formulated nickel baths can be determined colorimetrically with Nessler tubes. Full details of the analysis are given. If appreciable amounts of iron, and particularly copper, are present, this method cannot be used. In this case, the nickel must first be precipitated and the determination made only on the re-dissolved nickel precipitate. The sulfate determination is conducted in the usual manner by precipitation with barium chloride. Iron is determined by precipitation and determined by the Rheinhardt-Zimmermann method or by centrifuging. Zinc in the bath is determined by precipitation as zinc sulfide. The cadmium content in the nickel bath is determined in a similar manner to the zinc determination. The copper determination

can be conducted either by precipitation or colorimetrically. Full details are given of all these various analyses.

Characteristics and Formation of Porous Oil-Retaining Chromium Coatings in Relation to Bath Composition, Deposition Constants and After Treatment

R. Bilfinger: *Wissenschaftliche Berichte*. Vol. 46, p. 5 (Berlin).

In all chromium baths the current efficiency and plating speed as well as the hardness and structure of the chromium metal plated from different chromium baths is always a function of the bath temperature and cathode current density, and is independent of the composition of the chromium bath. For every chromium bath, working diagrams can be prepared, from which the plating range and plating limits can be prepared in relation to the current density and temperature.

It has been established by the author that, with constant current density, the transition from the mat-gray form to the bright structural form in chromium plating always occurs at the same bath temperature and, accordingly, there exists a transition point which is always realizable for the change from the mat-gray modification into the bright modification. In a chromium bath with 250 g./l. CrO₃ and 1% H₂SO₄ based on the CrO₃, with a constant current density of 50 amp./sq. dm. (about 500 amp./sq. ft.), for example, with a bath temperature of 41.6°C. a bright chromium plate is produced. The position of this transition point changes with the current density, and the temperature will be lower the smaller the applied current density.

If a chromium plate is anodically etched in an alkali solution, then the observation is made that all coatings produced in the range of the bright, hard chromium plates, then consist of a network of fissures, while the mat- and milky-white coatings do not show this. It is shown that, with anodic or cathodic polarization of chrome deposits, a network of cracks and fissures is produced and can only be developed if the chromium coating is deposited in the separation range of the bright hard chromium deposits within a temperature range of 35° to 70°C.

Precise working conditions were

elaborated to ensure the formation of this network, with constant bath composition, as a function of the bath temperature and working current density. The mesh width of the network produced is narrower, the lower the bath temperature or the lower the current density. With rising catalyst content in the bath, the mesh width becomes narrow. For producing a chromium plate with oil-retaining properties, the chromium baths with a low catalyst content are preferable. The characteristics of the network are dependent on the nature of the catalyst present. The network of cracks from a sulfate chromium bath is wide meshed. The network of cracks from a fluosilicate bath is extremely fine meshed. The network of cracks from fluoride baths is fine meshed. Increasing amounts of trivalent chromium or of foreign metal salts in the bath, such as iron, widen the network of cracks, and will finally suppress the crack formation.

With anodic etching of the bright deposit in chromic acid or caustic soda, or with the cathodic polarization in sulfuric acid solution, the width of the cracks formed is a function of the current applied, in amp./sq. dm.

With the above working data, it is possible to control precisely the formation of the oil-retaining network of cracks in the chromium deposit, by regulating and controlling all the factors concerned, as mentioned above.

Electrolytic Cleaning of Passive Lead Anodes

E. Lutter: *Metallwarenindustrie und Galvanotechnik*. Vol. 45, No. 9, p. 423.

Platers are well acquainted with the difficulties in cleaning passive lead anodes. The practical method is generally conducted by taking the anodes out of the bath at the week-end and bright-scratching with wire brushes. This, however, takes a long time and is a very tedious operation, as the non-conductive chromate formed is very hard. The author considers that quite often, with a bad-covering chromium bath, the trouble lies not with too-low a catalyst content but with too-large a passive anode surface. It has been found that the trouble most often happens at times of high production peaks when production interruption is least desired.

To remove the coating of yellow-red

lead chromate from the anodes better, they are usually immersed in dilute hydrochloric acid, to soften up. In no case should the chromate coating be allowed to dry on, as this will make the subsequent cleaning difficult.

A cleaning process was developed by the author which has been found to give very good results. The principle used is that the passive chromium coating is changed into the desired current-conducting dioxide form by electrolytic oxidation so that, in this form, the lead anodes can again be hung in the chromium bath. However, the lead dioxide formed can also be dissolved. The lead anodes to be cleaned are hung in an alkaline electrolyte containing caustic soda and oxidized for 10-30 minutes at room temperature and 6-8 volts. The exposure time will depend on the thickness of the chromium coating and will be between 10-15 minutes. The anodes should not be taken out too soon. After this treatment, the anodes are again activated and after rinsing, hung in the chromium bath. They possess a dark-brown coating of lead dioxide.

Chemical Polishing of the Yellow Metals

H. Spaehn: *Mitt. Forschungs Gesellschaft Blechverarbeitung*, No. 3, p. 25 (1955).

The author discusses the chemical polishing of brass and German silver, with special consideration of the practical data of the process. As the bath is a mixture of conc. nitric, phosphoric and acetic acids, tanks must be made of stoneware, stainless steel or plastic clad. Suitable fume ventilating equipment must be installed, because of the toxic nitrous fumes produced. The author instances a chromium plating layout as a suitable example of good fume venting.

The reflection characteristics of chemically and mechanically polished surfaces are compared by means of two curves. The curves show that, with all angles of incidence of the light, the reflection is better with mechanical polishing. As the chemical polishing gives a special structure, the polish should not be tested by the processes usually employed for measuring the reflection on mechanically polished surfaces. Details are given regarding the application possibilities of chemical polishing,

the alloys which can be treated, as well as practical details for conducting the process.

Corrosion Protection of Aluminum by Natural or Strengthened Oxide Coatings

D. Altenpohl: *Metall.* Vol. 9, No. 3, p. 164.

A review is first given of the technical literature on this subject. There is first shown a relationship between the oxide coating on aluminum and the potential behaviour of this metal. For practical corrosion behaviour, kinetic factors play a great role. The consensus is that aluminum may be regarded as corrosion resistant within a pH range of 4.5 to 8.5. This is the region of the stable oxide coating. It is pointed out that it is not only the hydrogen ions and OH ions which attack the oxide film, but that other cations and anions are able to dissolve the film. For example, aluminum is stable in aqueous ammonia solution but not in caustic soda solution.

The reason for this is that the latter completely dissolves the oxide film while this is not the case with ammonia. The following characteristics are given for the solution capabilities of anions in this respect:

1. What is termed the penetration capability which is governed primarily by the ion diameter;
2. The solution capability for aluminum oxide and aluminum;
3. The oxidation characteristics;
4. Coagulating action on the aluminum oxide-hydrate.

The growth of natural oxide films is then considered. The atmospheric oxide skin is a compact coating with a thickness of 30 to 50 Å; the coating attains a thickness of about 100 Å. An example of the artificially strengthened oxide coatings is the MBV process which produces oxide coatings which are some microns thick and contain about 75% amorphous aluminum oxide as well as 25% chromium oxide. It is indicated that, in the future, one may reckon on a greater use of the wash primers, which possess some advantages as regards lacquer keying on to the aluminum surface over the MBV process.

In conclusion, there is given a tabulation of the corrosion behaviour of variously produced oxide coatings on pure aluminum in very dilute hydrochloric acid.

Cadmium Plating

Metallwarenindustrie und Galvanotechnik, Vol. 45, No. 7, p. 331.

Cadmium adheres firmly to steel and, as cadmium is a relatively soft metal, the coating is fairly ductile. Cadmium plate, accordingly, is being used more and more for coating nuts and bolts, etc. To provide the maximum corrosion protection on steel, the objective is to produce a very compact, fine-grained, pore-free, bright deposit. Colloids added to the cadmium bath restrict the crystal growth and refine the grain size. Suitable colloids of this type are shellac, casein, tung oil (wood oil), molasses, dextrine, sulfite waste liquor, sugar, sulfonated oils. The last is very frequently used, Turkey red oil being the medium employed. Gelatine is used sometimes and also some metallic compounds. The colloid is used in the bath to the amount of about 1%.

The cathode efficiency amounts to about 85 to 95%. It can be raised still further by an addition of about 40 g./l. caustic soda. This also improves the brilliance and ductility of the cadmium plate. An advantage of the cyanide cadmium bath is that, with quite thin coatings of the order of 0.00025 in., pores are closed and sealed. The deposit is also dense and smooth and coatings up to about 0.004 in. can be easily produced. The baths have good throwing power so that recessed parts present no difficulty. In general, the acid baths do not work as well as the alkaline cyanide baths and so are not much used, with the exception of the fluoborate cadmium bath.

The cadmium fluoborate bath, as with all such baths, is characterized by high anode and cathode efficiency, easy control and good bath stability. A clean, matt surface is obtained; in general, bright plate cannot be obtained from these baths. The cathode efficiency of the fluoborate cadmium bath is about 100%, which signifies that there is little or no hydrogen generation at the cathode, this is of extreme importance for the plating of steel parts, particularly springs which are very sensitive to hydrogen embrittlement. However, in this connection it must be born in mind that, although the danger of hydrogen embrittlement can be avoided with the use of the fluoborate cadmium bath, this danger can still arise during the pretreatment of the metal prior to plating.

ing, such as pickling and cathodic cleaning for example. Consequently, due precautions must be taken, as otherwise the ware will already have absorbed the hydrogen before it passes into the cadmium bath. Consequently, at least 16 hours should elapse after pretreatment, before plating. Pickling inhibitors will reduce hydrogen absorption, but this can still occur if the metal is given a cathodic cleaning; here a short final anodic treatment after the cathodic, will serve to remove a great part of the hydrogen.

Coloring Non-Ferrous Metals

Metalloberflaeche. Vol. 9, No. 10, B 153.

The bath used for coloring contains 100-150 g./l. copper sulfate and 15 g./l. potassium permanganate. The baths are used near the boiling point for copper, but heating is not necessary with zinc, cadmium, aluminum and alloys. Tin and lead color up a yellowish-brown in this bath. Darker colors can be obtained on these metals, but usually do not adhere well. Very good results are obtained with this bath for black coloring of zinc and of zinc alloys. It is best to use a more dilute bath for zinc, an equivalent amount of water or twice as much being added to the above figure. A short dip is given, until the surface is covered with copper. The adhering solution is then allowed to act in the air, before rinsing, until the copper deposit has blackened. It is preferable to use copper nitrate instead of the sulfate for zinc metals, the bath being made up with about 15 g./l. copper nitrate and 2.5 g./l. potassium permanganate. Cadmium plated ware can be colored brown to a deep black with this bath.

Aluminum can be colored in this bath, the nitrate bath being somewhat better than the sulphate. For black colors, a solution is used containing 5-10 g./l. potassium permanganate and 20-25 g./l. copper nitrate. The action is improved by the addition of 2-4 cc./l. nitric acid. Nickel and nickel alloys, iron, and silver cannot be colored with this bath.

Bright and Mat Nickel Plates

Metalloberflaeche. Vol. 7, No. 1, B 7.

Bright nickel plating baths are now used very extensively in industry but the bright nickel plate has one drawback, this being that it has high in-



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ternal stresses and is brittle. Where a ductile nickel is required, recourse must be made to the mat nickel bath, the nickel-rich Watts type baths being suitable for this purpose. There are also cases where it is not desirable to use the deposit from a bright nickel bath. This is because of the occlusion of non-metallic constituents in the nickel deposit and the consequent suppression of the development of the crystalline structure. This has peculiar results, so that, in certain cases, parts coated with a bright nickel plate, as for example bicycle bells, no longer give a full metallic ring. On the other hand, no trouble is encountered when they are plated in a mat nickel bath.

Another case where bright nickel

plate cannot be applied is where a high electrical conductivity is required. Nickel is not as good an electrical conductor as copper or aluminum; these metals cannot however always be used in practice. In the electrical, radio, and similar industries, magnetic nickel coatings are required which must reach the maximum degree of conductivity attainable for this metal. This form of electrolytic nickel can only be obtained from the mat nickel bath. The current density, when nickel coatings of this type are being produced, must be held so low that as little hydrogen as possible is co-deposited. Heating of the nickel parts for the removal of the hydrogen that is actually absorbed, up to over 100°C. is also advisable.

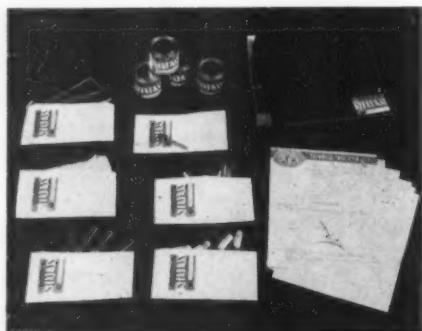
Recent Developments

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Repair Kit for Plating Barrels

Frederic B. Stevens, Inc., Dept. MF,
1800 Eighteenth St., Detroit 16, Mich.



A complete new low cost repair kit for Plexiglass and Lucite plating barrels has just been put on the market. Repairs, using the new kit, are extremely easy to make since the previous practice of applying layer after layer of fiberglass cloth has been eliminated. The new kit actually permits performance of a simulated welding process, permitting an integral bond between repaired area and the original barrel sections.

Price for a complete kit, including sheet plexiglass, acrylic casting resin, catalyst and promoter components, etc., is \$21.00.

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Periodic Reverse Rectifier

Sel-Rex Corp., Dept. MF, 155 Manchester Place, Newark, N. J.

A new rectifier permits periodic reverse operations at output ratings greatly exceeding the 1,000 ampere single unit limitation of equipment previously available for such applications. Developed in conjunction with Unit Process Assemblies, Incorporated, of New York City, who built the periodic reverse controls, it is said to eliminate the need for separating tank anodes and cathodes into cells of maximum capacities of 1,000-amperes each.

This new rectifier is expected to be of special interest to companies doing heavy electroplating or electroforming

where periodic reverse or "de-plating" methods are used to eliminate nodules and other irregularities which tend to build up in such operations. It is reported that only one small control panel is needed at the plating tank, regardless of the total amperage of the installation, as compared to the split bus bars and other cumbersome tank attachments previously required by installations exceeding 1,000-amperes.

The standard Unit Process Assemblies 1,000-ampere periodic reverse unit is used in multiple sections. Voltage is regulated to within 2%. A specially designed magnetic amplifier control circuit maintains a current balance be-



tween units within 3%, thus enforcing periodic reverse units to function within their specified ratings, regardless of how many are connected in parallel.

In addition to an appreciable savings in initial expenditure and installation costs, it is reported that periodic reverse rectifier installation affords greater versatility in that much larger single pieces can be electroplated by this method.

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Glazer and Mirror Finisher

Clair Mfg. Co., Inc., Dept. MF,
Olean, N. Y.

Model No. 402 glazer and mirror finisher for the cutlery and related

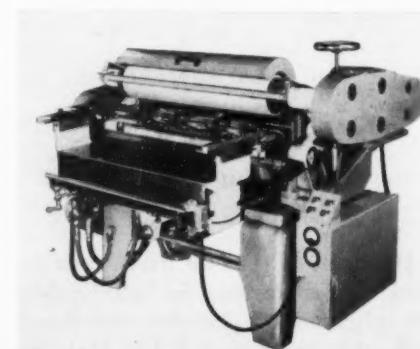
industries meets all requirements for any surface finishing operation on blades or handles, flat or contoured, and can be converted to an "edger" in a few seconds. As a standard unit, it is available at a volume "package" price.

The machine places strong emphasis on safety and efficiency. Body contact with the emergency bar simultaneously opens rolls, cuts motors and arrests all actuators. The work rack serves as a foolproof operating control. When withdrawn, the rolls open automatically; when properly and safely replaced in guide-ways, they close again. Any failure of the safety circuit forestalls the closing action.

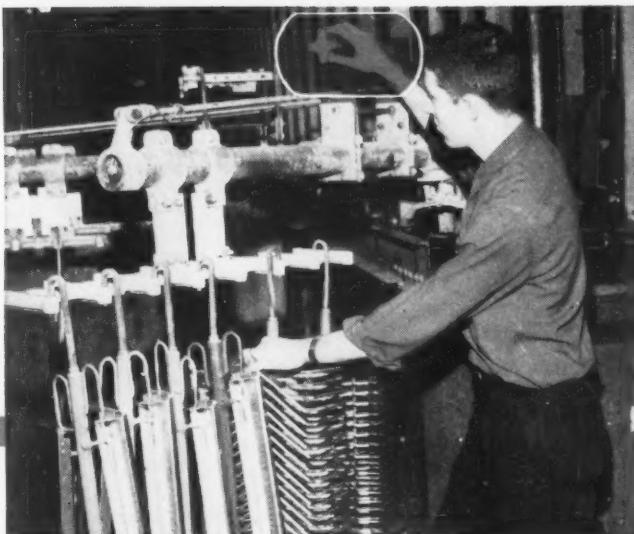
Safety has been emphasized in the application of bar compound. Horizontal design assures maximum efficiency with minimum operating fatigue; 40" waist level loading requires no back bending, but allows perfect visibility and exceptional cleanliness. The rolls can be changed in two minutes; they float against controlled air pressures, ready to withstand forced opening without damage.

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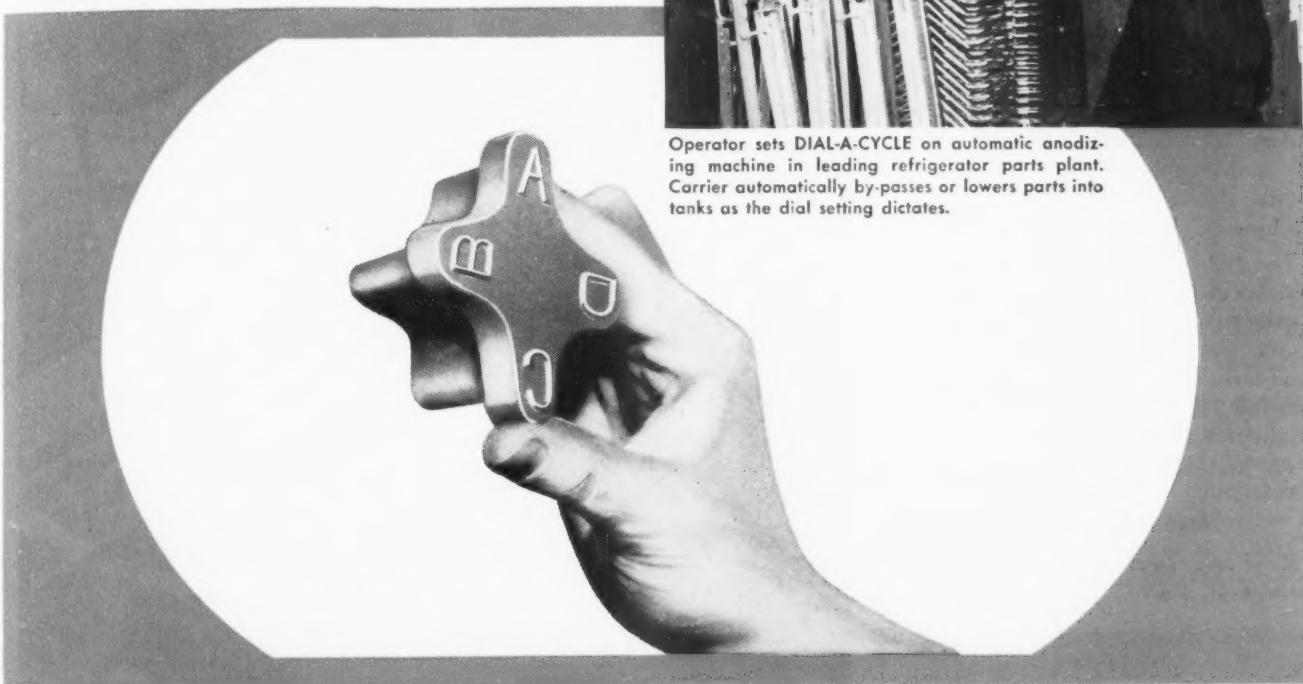
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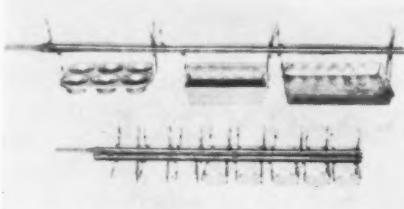
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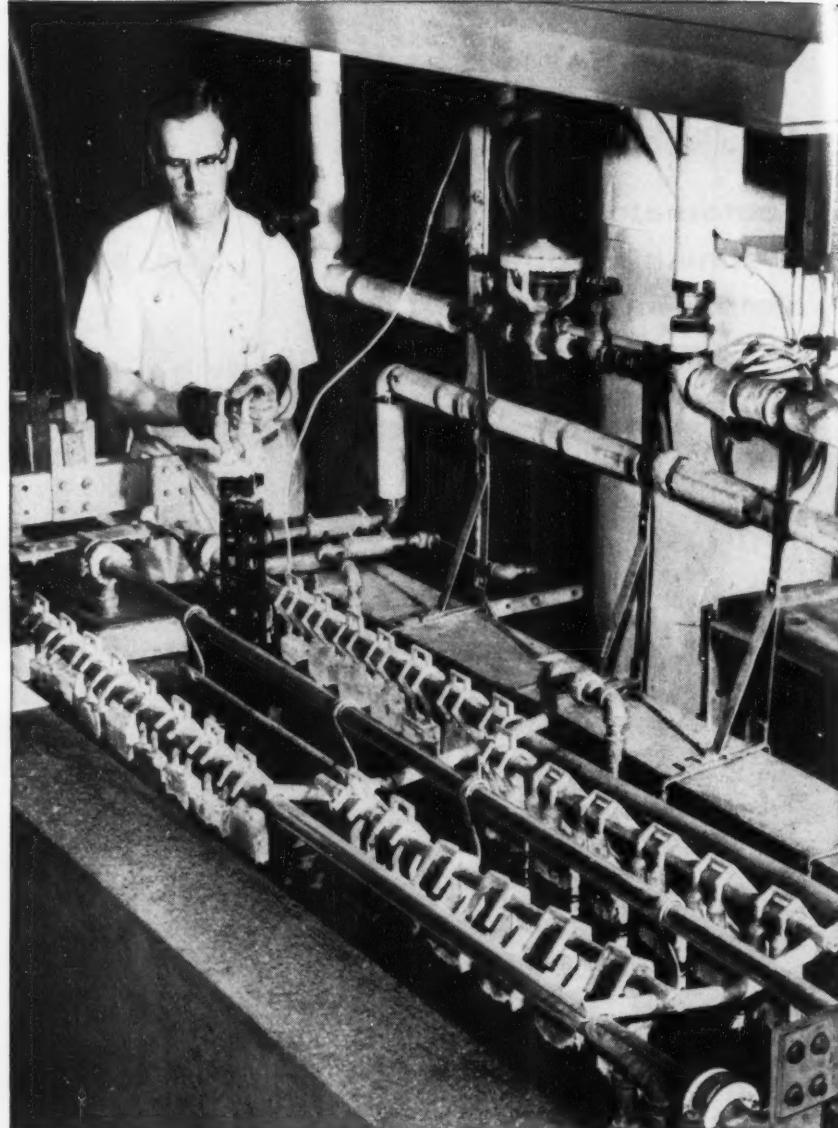
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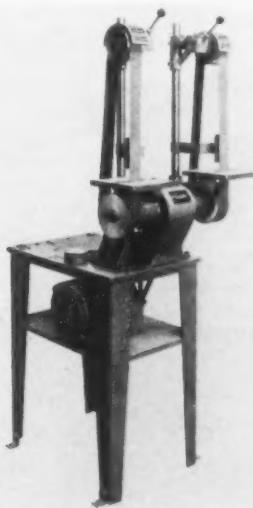
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protective film which forms on titanium continues to conduct electricity.

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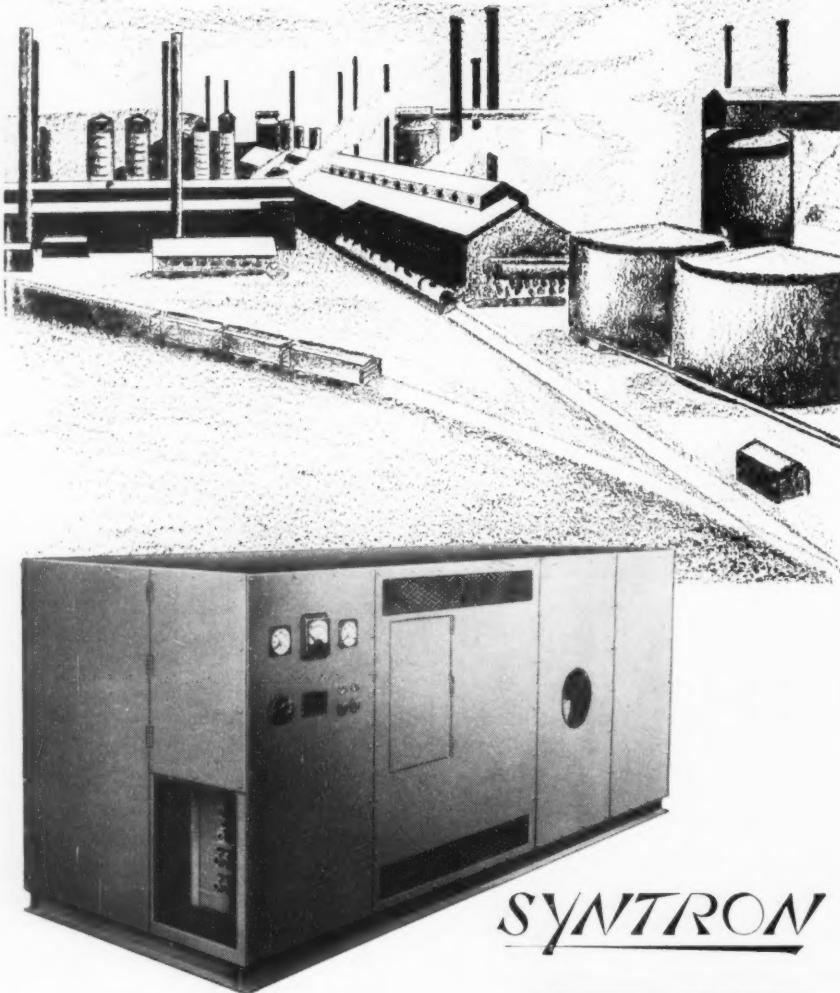
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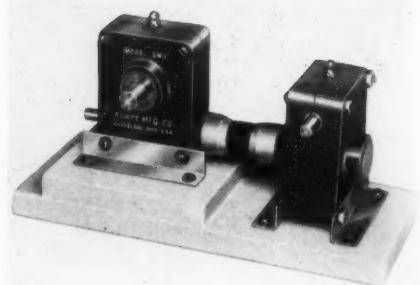
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ber. A cement is also available for bonding it to metal surfaces.

The complete kit containing 1 lb. each of tan and black putty plus 1/2 pt. liquid vulcanizer is sold at an industrial net price F.O.B. Akron, Ohio of \$6.60.

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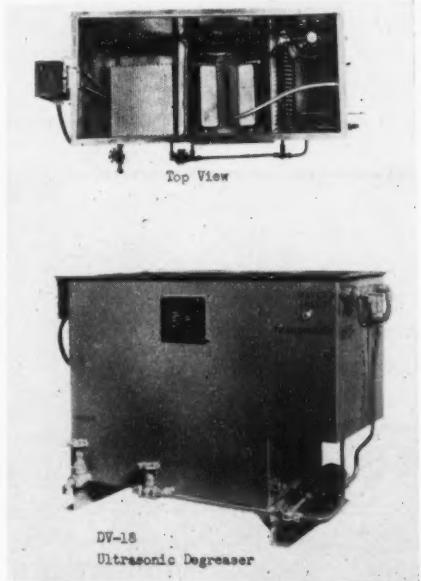
Small-Scale Ultrasonic Degreaser

*Ramco Equipment Corp., Dept. MF,
1373 Lafayette Ave., New York 59,
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The DV-18 is a compact, small-scaled duplicate of large ultrasonic degreasers. This bench model can be used in engineering institutions, colleges, chemical testing laboratories and even for continuous production work.

The work area is 9" x 9" x 6" high with a capacity of 100 lbs./hr. minimum. Overall size is 33" x 15" x 24" high; total weight 75 lbs.

This unit comes complete with all accessory equipment to insure absolute



precision work. Construction is stainless steel throughout and it features thermostatic control, filter, manual spray, copper cooling coils, stainless heater and solvent recovery system.

66/Circle on Readers' Service Card

Ultrasonic Transducers for High Temperature

*Acoustica Associates, Inc., Dept.
MF, Glenwood Landing, N. Y.*

Two new transducers are designed for use in high temperatures environment, (i.e.—irradiating high temperature solutions, metals), for developing high amplitude ultrasonic motion, and

look at these advantages of

IRIDITE[®] FINISHES

for

CORROSION-RESISTANCE, PAINT BASE on ALUMINUM and MAGNESIUM

EASE OF USE—Iridite is a simple chromate conversion treatment. Fast, easy, economical. You just dip, brush or spray it on the part at room temperature. No special equipment. No specially trained personnel.

OUTSTANDING PERFORMANCE—Forms a film that is an integral part of the metal itself. Can't flake, chip or peel. Takes paint firmly on initial application, and the bond lasts. Even protects areas scratched in use.

LOWEST COST—You have only minimum equipment cost, no special racks, high speed operation, lower overall handling costs.

CHOICE OF APPEARANCE—Clear coatings that retain metallic lustre to dark, maximum protection coatings. A variety of colors is available by dyeing.

IRIDITE # 14 and # 14-2 (Al-Coat) for ALUMINUM

Two specially formulated finishes that give you maximum latitude in aluminum treatment. Both provide excellent corrosion protection and paint base. Iridite #14-2 is an improved product that allows greater flexibility in operation and coating thickness and produces the optimum in corrosion protection. Either coating provides corrosion resistance superior even to complicated electrolytic treatments in a fraction of the time. These coatings also offer many other valuable characteristics: they have low electrical resistance, they aid in arc-welding, provide a good base for bonding compounds, have no effect on the dimensional stability of close-tolerance parts. Final appearances ranging from clear through yellow iridescence to full brown can be obtained. By dyeing, you can produce red, green, blue, orange or yellow finishes.

IRIDITE # 15 for MAGNESIUM

Produces a protective, paint base film with corrosion resistance at least equal to that obtained from long, high-temperature dichromate treatments in a fraction of the time and at room temperature. The appearance of the coating can be varied from light brown to dark brown and black.

APPROVED UNDER GOVERNMENT AND INDUSTRIAL SPECIFICATIONS

SEE FOR YOURSELF WHAT IRIDITE CAN DO . . . SEND SAMPLE PARTS FOR FREE PROCESSING. Look at the results, test the protection, evaluate the savings. Also write for handy Reference File of the most complete data published on chromate conversion coatings. Or, for immediate information, call your Allied Field Engineer. He's listed under "Plating Supplies" in your classified phone book.

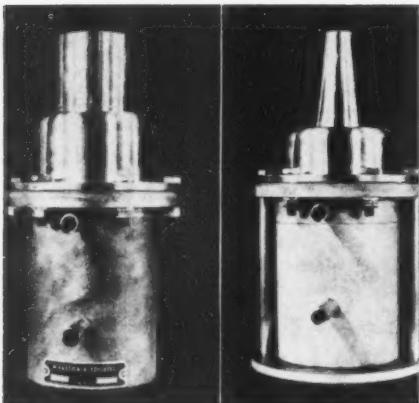
ALLIED RESEARCH PRODUCTS

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Manufacturers of Iridite Finishes for Corrosion Protection
and Paint Systems on Non-Ferrous Metals; ARP Plating Chemicals.
West Coast Licensee—L. H. Butcher Co.





for many other cost savings industrial applications.

Featuring internally biased, water-cooled, 400 watt average—1,600 watt peak power magnetostrictive driving elements operating at 25 kilocycles per second, these highly stable transducers can be driven singly or in groups by appropriately rated standard ultrasonic generators from 400 watts to 10 kilowatts and above.

The Model AT-1,600 B on the left features a cylindrical stainless steel coupling slug measuring 2" OD x 4" long. A water cooling jacket integral with the transducer cooling system ex-

tends up 2" to the nodal point where the slug is supported at the point of zero motion. This cooling allows the transducer to be used with the emergent face directly in contact with liquids at temperatures up to 900°C. Alternatively, the emergent face may be used as a vibrating platform for ultrasonic soldering and welding operations.

Model AT-1,600 C on the right features a tapered stainless steel amplitude multiplier having an emergent face 3/4" OD fitted with a tapped hole. This unit may be used for many different kinds of ultrasonic work where large peak-to-peak amplitudes are required.

68/Circle on Readers' Service Card

Hoist Pans

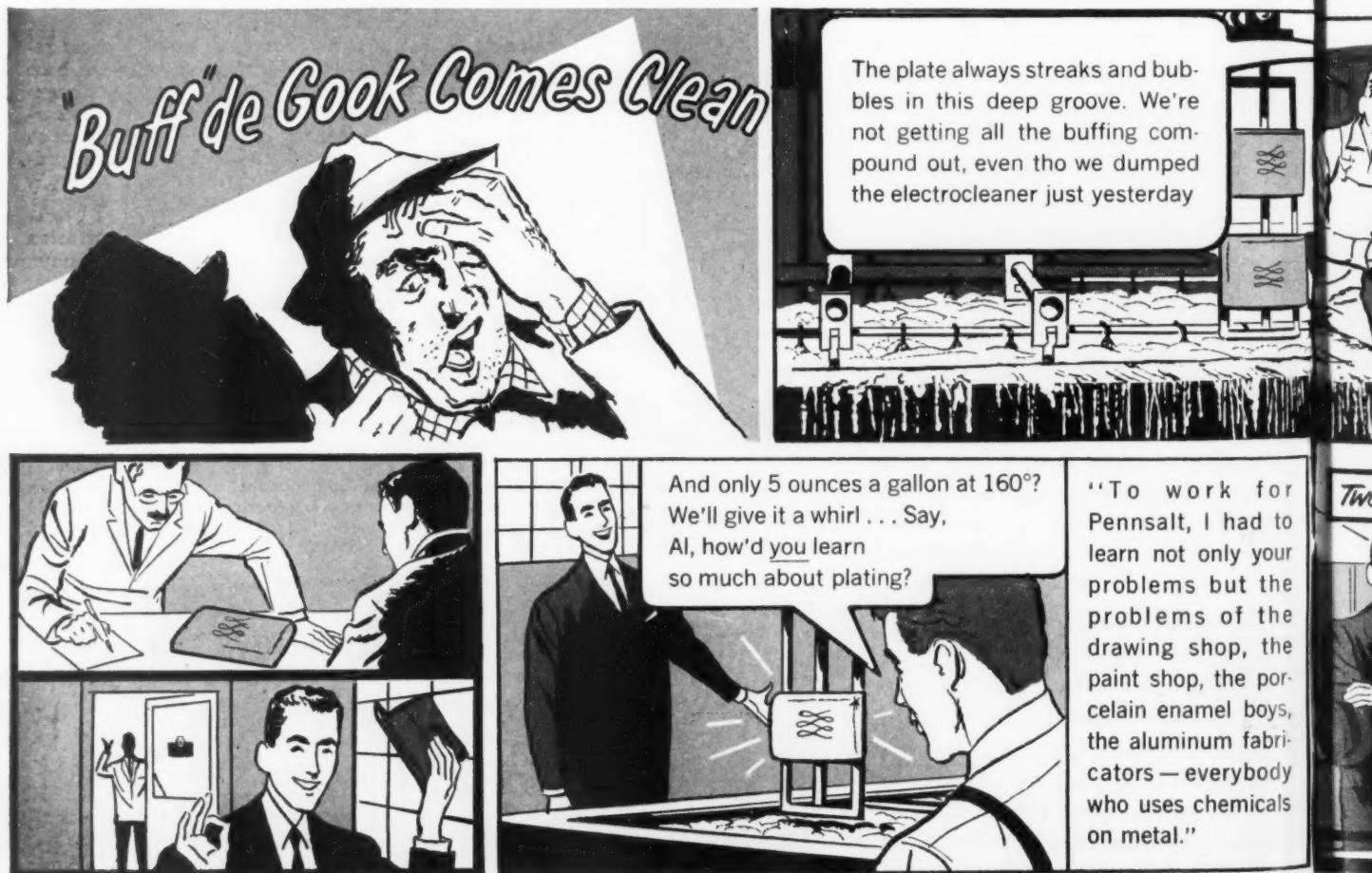
Lord Chemical Corp., Dept. MF, York, Pa.

New welded hoist pans to expedite loading of chips and other media range in capacity from 4 to 14 cu. ft. All are fabricated from 10-gage sheet steel and fitted with either rollers or roller-bearing wheels. Balanced yoke at top provides for crane or hoist hook.

"Lorco" Model 11 hoist pan will transport up to 1,400 lb. of fused aluminum oxide chips to the finishing barrel.

To secure a chip load, the pan is placed under gate of storage bin. Gate is lifted, admitting chips of selected size into the hoist pan. If a mixture of chips is desired, the pan is rolled from bin to bin until the proper sizes and amounts have been obtained. Pan is then lifted by hoist and carried to the barrel. Its load of chips funnels down a chute at front end through the barrel door, which should be protected by loading guard.

Model 4, capacity 4 cu. ft., will hold a load up to 500 lb. of fused aluminum oxide chips. Length 43 in., width 24 in.



height 13 in. Model 6.5, capacity 6.5 cu. ft., will hold a load up to 800 lb of fused aluminum oxide chips. Length 65 in., width 19 in., height 15 in.

Model 11, capacity 11 cu. ft., will hold a load up to 1,400 lb of fused aluminum oxide chips. Length 81 in., width 27 in., height 14 in. One pan will fit under Lorco 323 barrel, two pans under Model 348.

Model 14, capacity 14 cu. ft., will hold a load up to 1,800 lb of fused aluminum oxide chips. Length 81 in., width 33 in., height 14 in. One pan will fit under Lorco 330 barrel, two pans under Model 360.

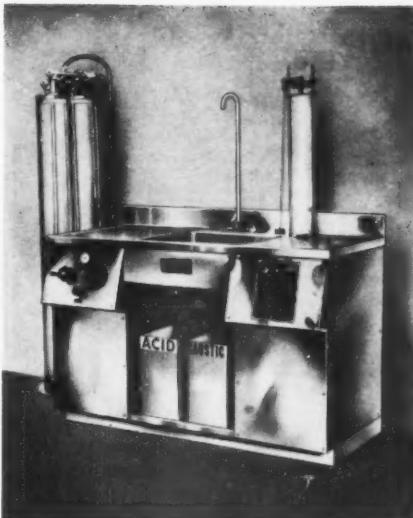
69/Circle on Readers' Service Card

Demineralizer

*Penfield Mfg. Co., Inc., Dept. MF,
19 High School Ave., Meriden, Conn.*

The new T-20, SR-1 system solves the problem of distribution of high purity water by purifying it at the points-of-use, at rates up to 40 gph. The mono-column units used for this purpose eliminate all danger of metal contamination by having all their wetted parts of plastic construction.

Operating costs remain exceptionally



low because the mixed-bed cation and anion resins used in the units are not thrown away after they are exhausted, but are regenerated quickly and easily by the SR-1 Regenerator, an in-plant component of the new demineralization system.

Here's how the system works:

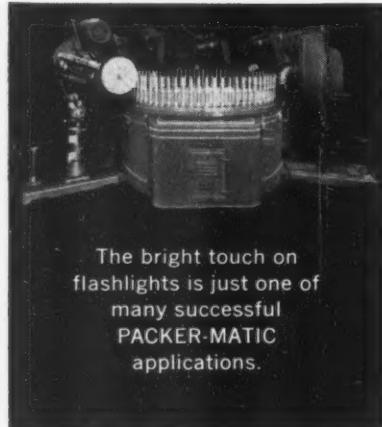
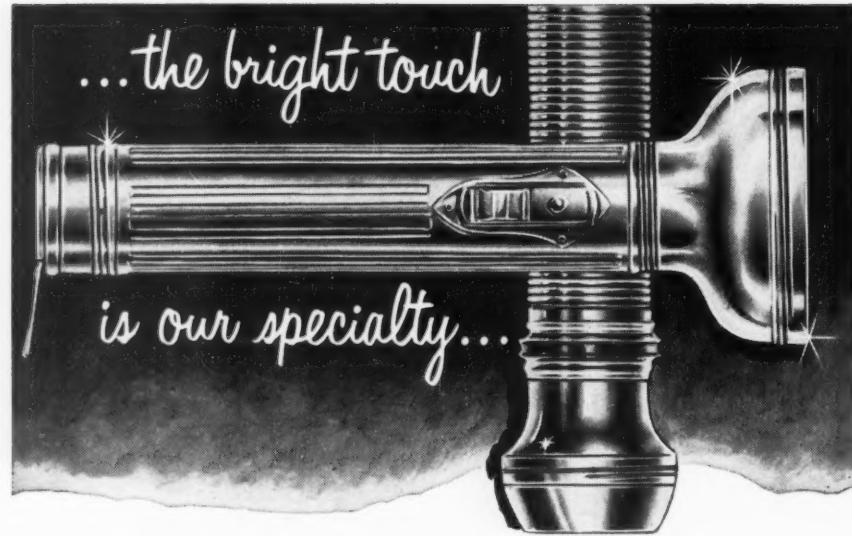
1. In accordance with whatever schedules appear desirable, the canisters of mixed bed resins in the units are removed and replaced with stand-

by canisters of fresh resins. This replacement step takes less than 2 minutes and an exclusive ball-check, insuring one-direction flow, prevents any dripping during the canister removal operation.

2. The exhausted canisters are next taken over to the regenerator where the contents of seven such canisters can be regenerated at one time by a single operator who needs only to prepare the acid and caustic solutions and turn a sequence time switch. The exhausted resins are separated, regenerated, reloaded into their canisters, rinsed and tested, all semi-automatically.

3. The entire regeneration process, including reloading the regenerated resins into the seven canisters and testing the purity of effluent, requires only an hour and a half. Thus one regenerator — which includes separating and regenerating columns, acid and caustic tanks, eductors, and all necessary valves and piping in one compact unit — can handle the regeneration requirements of a large number of units supplying ultra-pure water at point-of-use.

70/Circle on Readers' Service Card



The bright touch on flashlights is just one of many successful Packer-Matic applications.

PACKER-MATIC completely automatic polishing, buffing and deburring machines are engineered to meet the demands of modern mass production methods for speed, economy and efficiency in finishing operations.

Whether you handle long production runs, short odd lot jobs, or a mixture of both, Packer-Matic is the machine for you. Let Packer's engineers help you meet your finishing requirements for faster, low cost polishing, buffing and deburring with more uniform results. Send blueprints or sample parts and we will show you how to speed up production and cut costs with a Packer-Matic.

PACKER-MATIC

THE PACKER MACHINE COMPANY • MERIDEN, CONN.

Pioneer Manufacturers of Automatic Polishing and Buffing Machines

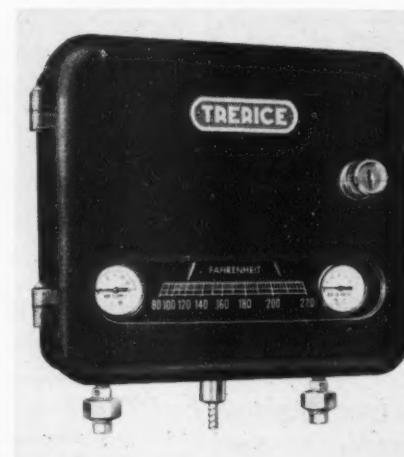
72/Circle on Readers' Service Card

Temperature Controller

H. O. Trerice Co., Dept. MF, 1420 W. Lafayette Blvd., Detroit 16, Mich.

A new mercury actuated, air operated indicating temperature controller is available in two basic types, "on-off" fixed high sensitivity, or "proportional band." The new controller can be changed from direct to reverse acting, or vice-versa, without tools. The fixed high sensitivity controller is normally used on batch type processes, where "on-off" valve cycling is satisfactory, usually where there is a large demand or load, and small supply. It can be used efficiently on a wide range of industrial applications. The "proportional band" type offers throttling

control for continuous flow processes, where cycling and over-shooting cannot be tolerated, and is particularly



adaptable to applications having variable time lags and capacities, and where load changes are not frequent.

Specifications: wall mounted cast aluminum case with bottom outlet. Standard ranges to 800°F. and furnished with 5 ft. heavy, flexible bronze connecting tubing, 3/4" N.P.T. chrome plated union fittings, and stainless steel bulb for liquid immersion.

73/Circle on Readers' Service Card

Low-Cost Plating Filter

Sparkler Mfg. Co., Dept. MF, Mundelein, Ill.



The above manufacturer announces the availability of an inexpensive, new 500 g.p.h. plating solution filter, complete with pump, motor, and suction and discharge hose. A simplified, new construction principle allows the filter, called the Plater's-Pal, to be sold for only \$295. The unit is sold only through plating suppliers.

The unit handles all acid and cyanide solutions except chromic acid and high chloride nickel. Though completely enclosed, all operating parts are easily accessible and can be inspected without dismantling the filter. Because only clean solution flows through the pump, there is no excessive pump wear. All solution is reclaimed. The filter can be cleaned and put back in operation in 10 minutes, it is stated.

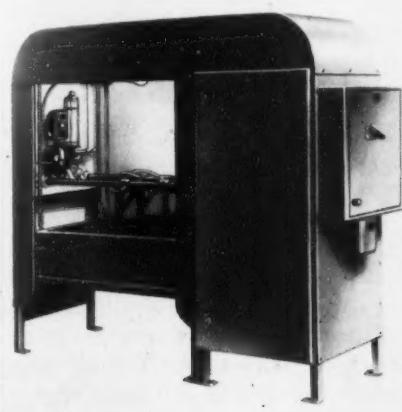
74/Circle on Readers' Service Card

Deburring Machine

Metal Parts Sales Co., Dept. MF, 165 Delancey St., Newark, N. J.

The "Reciprotron" is designed for deburring, polishing, micro inch finishing and generating radii on machined parts. The reciprocating action

of the machine operates on the principle of fixturing parts in racks, which are placed into quick releasing rack holders. The fixtures and parts are reciprocated by two self lubricating driving shafts powered by a 3 H.P. motor with an adjustable variable speed of 90 to 380 strokes per minute. A pan containing the proper abrasive or polishing media and solution raises to submerge the reciprocating fixtured parts in the media for a predetermined running cycle (usually from one to ten minutes). The pan raising mechanism is equipped with a safety feature which employs a magnetic slip clutch



to control excessive pressure and prevent distortion on the parts as the pan and media rise to cover the fixtures.

The company claims that the primary advantages of the machine are its unique fixturing design which prevents marring and nicking of the parts, the speed with which the parts can be deburred and finished, and eliminating the necessity of unloading and loading media, water and compound after each cycle.

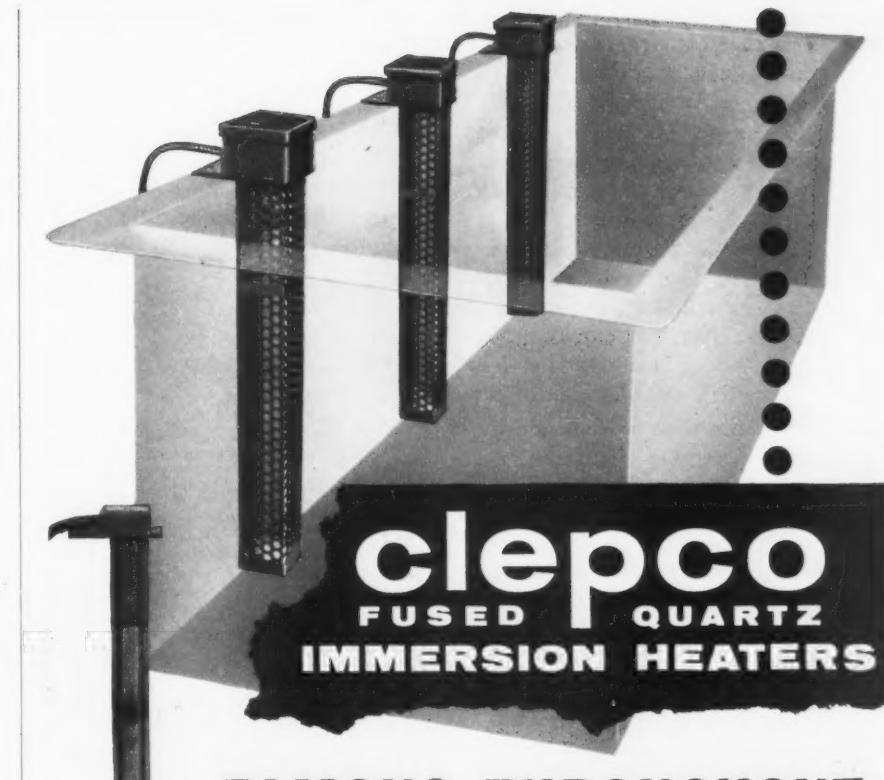
The Model 50 is fully automatic, measures 94" x 36" x 84" and has a shipping weight of approximately 2,400 lbs. Size of machine may be varied to custom specifications. The control panel is completely wired to J. I. C. specifications and only air, water and power connections are required. The machine is ideally suited for automated production and it is said one operator can handle three machines of this capacity with minimum effort.

75/Circle on Readers' Service Card

Hollow Cone Pattern Spray Nozzles

Spraying Systems Co., Dept. MF, Bellwood, Ill.

The new Hollowjet spray nozzles offer an unusually wide range of ca-



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FAMOUS THROUGHOUT THE PLATING INDUSTRY For Quality, Efficiency, Low Cost Operations

OVER 100,000 INSTALLATIONS

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CLEPCO STEEL and STAINLESS HEATERS
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76/Circle on Readers' Service Card



spray pattern. At 40 lbs. pressure these nozzles produce a spray with a 30 degree spray angle. The spray nozzles are made in pipe connection sizes from $1/4$ " to 5" in brass, steel and stainless steel.

These nozzles were designed for a wide variety of applications, where concentration of the pattern area is necessary.

77/Circle on Readers' Service Card

Barrel Zinc Brightener

*Smoothex Corp., Dept. MF, 10705
Briggs Road, Cleveland 11, O.*

A new zinc brightener, under the trade name of Zinc-Kote, is being introduced to the plating industry for

capacities from 1.5 gpm to 1,100 gpm, all with a relatively small diameter

improved quality barrel plating of small parts at lower cost. When added to a bath, it produces brilliant zinc deposits on the entire surface of all the parts being plated. Time is saved and production is speeded because bright plating is done directly from the bath to eliminate subsequent bright dipping.

The close-grained, thick zinc deposits that are formed assure an excellent underseal for finishes and protects the parts from rust and corrosion. A good foundation is also provided for chromate finishing and phosphating.

Because of the wide current density range, uniform zinc deposits are claimed to be made on all parts within the barrel. Plating current ranges from 60 to 90 amperes per square foot, it is said, depending upon the type of work being processed.

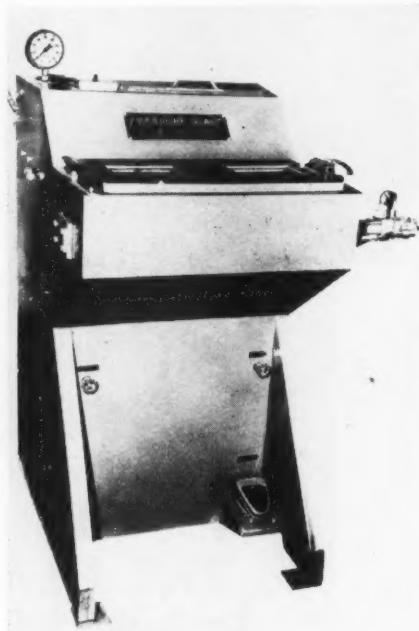
Bright zinc is produced consistently with the simplest control. Because it is a non-metallic addition agent, it is compatible and effective in all zinc barrel solutions. It has exceptional adaptability, offers maximum throwing power and unusual staying power to make zinc barrel plating more dependable.

78/Circle on Readers' Service Card

Wet Blast Unit

*The Cro-Plate Co., Inc., Dept. MF,
747 Windsor St., Hartford, Conn.*

A new, extremely versatile wet blast unit is adaptable to the deburring of small machined components; cleaning of stems on electronic tubes; satin-finishing of men's jewelry items such



as cuff links; cleaning of sparkplugs; stripping wire ends; etc.

Operated from a sitting position, the operator picks up the parts to be done, loads them (2 at a time) into the 2 gasketed bays at the top of the cabinet and depresses the foot switch to blast. Guns within the cabinet may be fixed in position, rotated or stroked if necessary. The unit in the photograph shows an air cylinder used for a lateral stroking motion.

Masks may be fitted in the work loading bays for the protection of areas of the work-piece not requiring blasting or to achieve decorative, contrasting bright and satin finishing.

80/Circle on Readers' Service Card

All Plastic Vaned Duct Section

*Haveg Industries, Inc., Dept. MF,
900 Greenbank Road, Wilmington, Del.*

A vaned 90 degree elbow has been developed for incorporation in corrosion resistant fume duct system. They can be made available for rectangular and circular systems to cut down turbulence and speed flow for any angle turns. Manufactured exclusively of polyester glass reinforced plastic these ducts are said to offer a high corrosion resistance with extreme light weight construction. Field assembly by means of bolted flanges (as in duct section shown) or by field welds is said to provide erection ease and speed greater than for metal ducts of similar size.



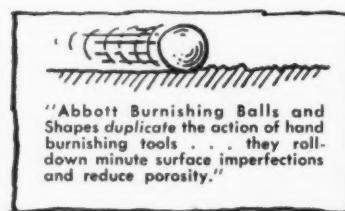
Barrel Finishing Notes: by the abbot

NOTHING BURNISHES LIKE STEEL BALLS AND SHAPES

"Burnishing is a lot like ironing a shirt. It presses and smoothes the surface of the material. For centuries, jewelers, engravers and other craftsmen have done the same thing to metal surfaces with hand burnishers of hardened steel.

"Today, we mass-produce the same fine burnishes with Abbott deep hardened steel Burnishing Materials. Made in six scientifically designed shapes, they're unsurpassed for giving stampings, castings and other parts a truly burnished finish. Used in the famous Abbott Vertical Barrel, they save dollars and hours in metal finishing operations."

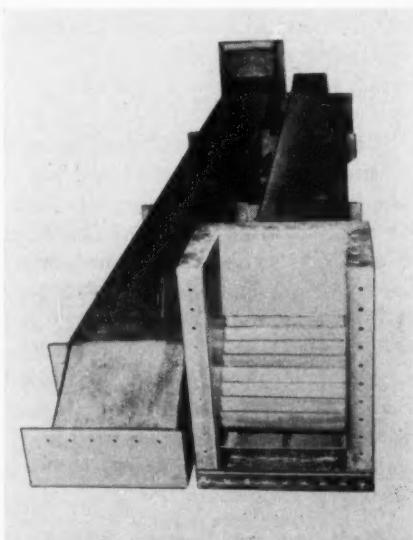
**WANT YOUR COPY OF THE NEW ABBOTT
BURNISHING BROCHURE? WRITE TODAY!**



"Abbott Burnishing Balls and Shapes duplicate the action of hand burnishing tools . . . they roll down minute surface imperfections and reduce porosity."



THE ABBOTT BALL COMPANY
1052 New Britain Avenue • Hartford, Connecticut

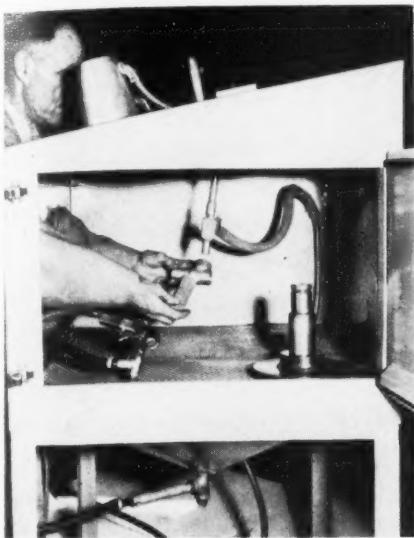


and capacity. Net installed cost is claimed to be lower than for any other system offering comparable corrosion resistance.

81/Circle on Readers' Service Card

Abrasive Blast Cabinet

Cyclone Sandblast Equipment, Dept. MF, 42 Clara St., San Francisco, Cal.



A new sandblast cabinet may be used either with its adjustable mounted blast unit or with a trigger-controlled hand blast gun.

It permits fast production runs that lend themselves to sandblasting by mounted blast units, yet the hand gun can be used by the same operator when he has angles and crevices which are awkward to do with any fixed unit.

The mounted unit may be raised or lowered to more conveniently blast the object, and it may be raised out of the way when the hand gun is used. The blast action of the mounted unit is controlled instantly by a stop-and-start foot valve.

The triggered hand gun, originally developed for use by the Navy, is optional equipment with this cabinet.

82/Circle on Readers' Service Card

Desmutting Agent for Aluminum

Cleanite Products, Dept. MF, 2649 Bristol Pike, Cornwells Heights, Pa.

Cleanite 8 is a granular product used to desmut aluminum after etching. It is also used to remove the dark oxide film after cleaning in a non-etch type aluminum cleaner. The special activating salts in this product are stated to insure maximum bath life and rapid desmutting.

Stainless steel (316), lead lined, Koroseal, or plastic tanks are used. The product is dissolved in cold water and used at room temperature or temperatures up to 120°F. Air agitation is helpful in dissolving and mixing the fresh bath.

83/Circle on Readers' Service Card



You are invited to consult our engineering staff about your finishing problems.

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RIGHT" EQUIP-
MENT AND ENGINEERING
EXPERIENCE ARE THE AN-
SWER TO YOUR POLISH-
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ING NEEDS.

Whether you need a single, standard polishing head or a specially engineered, fully automatic production line with all the trimmings, Murray-Way can do the job better, more reliably, for greater operating efficiency.

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Polishing, Buffing, Grinding, Filtering Equipment
that automatically cuts your costs.

**THE NEW VERSATILE
NON-DESTRUCTIVE
COATING-THICKNESS
TESTER**

DERMITRON

Unit Process Assemblies, Inc., pioneers in non-destructive testing and specialists in electronics for metal finishing, offer their latest DERMITRON D-2 with these features:

- Measures plated coatings on steel, brass, copper, zinc die-cast, aluminum, nickel-silver, bronze and other metals; also nickel on steel.
- Measures anodize and hard-coat on aluminum and magnesium; also paint, porcelain, organic coatings on non-ferrous metals.
- Measures metal coatings on plastics, ceramics and other non-metallic materials.
- Sorts or matches metals and alloys.
- Available with FOUR measuring probes for extra-wide thickness ranges from thin to thick deposits.
- Special probes can be provided for measuring internal diameters, small diameters and otherwise inaccessible areas.
- Only $\frac{1}{8}$ " circle area required for measurement.
- You get fast, accurate, direct readings plus versatility and portability.

Write for latest brochure and questionnaire to help solve your thickness testing problems.

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UNIT PROCESS ASSEMBLIES, INC.

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85/Circle on Readers' Service Card

Stainless Steel Liquid Meter

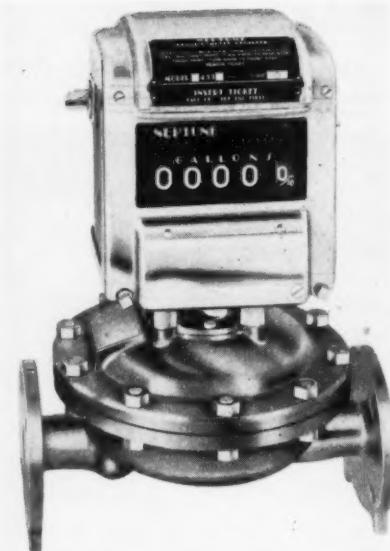
*Neptune Meter Co., Dept. MF, 19
West 50th St., New York 20, N. Y.*

Based on the highly accurate positive displacement principle, with only one moving element exposed to the liquid, this new stainless steel meter now makes it possible to obtain close metered control over corrosive solutions and chemicals which must be kept pure.

Meter casing and measuring chamber are Type 316 stainless steel. The gear train is mounted outside the meter casing and is completely isolated from the liquid. Because of this, the meter has only one moving part exposed to the metered liquid. There is

no need to drain and flush the meter for periodic shutdowns just to protect the gearing. All wetted parts are either Type 316 stainless steel or special corrosion-resistant non-metallic materials. Choice of disc and stuffing box materials depends on the liquid being metered.

Capacity of this 1-1/2 in. meter ranges from 20 gpm. minimum to 100 gpm. maximum for most liquids. It is available with a choice of direct-reading, ticket-printing or Auto-Switch registers. In the latter, an electric switch is automatically actuated when a predetermined quantity of liquid has been delivered. This switch can be used to operate valves, pumps, signals, agitators, etc., in automatic batching or processing operations.



Registers can be calibrated for U. S. gallons, pounds, Imperial gallons, liters, and other units. Calibration adjustments are easy to make when necessary to meet changing conditions of temperature, specific gravity, etc. Once set, the positive-locking adjustment mechanism cannot slip or "drift."

86/Circle on Readers' Service Card

Protective Skin Preparations

*Otis Clapp & Son, Inc., Dept. MF,
439 Boylston St., Boston 16, Mass.*

Sanchia silicone protective skin preparations are said to have a smooth consistency; long-lasting effectiveness; and a nearly neutral pH, adjusted to normal skin acidity.

The cream will repel moisture and irritants, while remaining non-toxic, inert, and non-sensitizing. It is also claimed to prevent lost time due to industrial dermatitis.

87/Circle on Readers' Service Card

Automatic Tank Selector

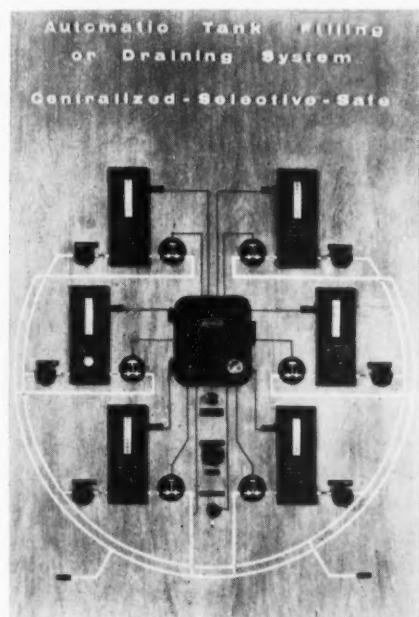
Mason-Neilan, Dept. MF, 60 Natick St., Norwood, Mass.

A new automatic tank selector system has been developed for controlling the filling of storage and settling tanks. The system uses a pneumatic circuit, with a selector-controller and level transmitters directing operation of pneumatic fill valves. The system is said to be extremely accurate, reliable and economical.

In operation, the selector-controller automatically senses the liquid level of each tank in the system through the level transmitter and then automatically opens the fill valve if tank requires filling, or automatically cycles to next

tank if filling is not required. This is the scanning operation which can be continuous or intermittently cycled as needed, requiring only one second per tank. Each circuit can handle up to twelve tanks and two or more selectors can be connected in series to control any number of tanks.

The basic selector-controller is sturdily built with easy connection of input and output signals. Unit is remotely installed for centralized control. Reliability is emphasized with all-weather construction and components, ample power for positive selector positioning and built-in protection against simultaneous draining and filling. Scanning is normally automatic, and has visual indication of operation. Complete flexibility in operation provides for use with two or more tanks in any combination.



Low cost is also one of the most attractive advantages of the new automatic tank selector. The system requires only one control valve, and one level transmitter for each tank, plus the one selector-controller unit for every twelve tanks.

88/Circle on Readers' Service Card

Stainless Steel Rotary Pump

Eco Engineering Co., Dept. MF, 12 New York Ave., Newark 1, N. J.

A low-capacity, self-priming positive displacement pump in 304 molybdenum-free stainless steel is now available for immediate delivery. With corrosion-resistant materials of construction, this pump is suited for laboratory, pilot plant and production opera-

the best in the business...

RUTLEY

BURNISHING • TUMBLING and CLEANING COMPOUNDS

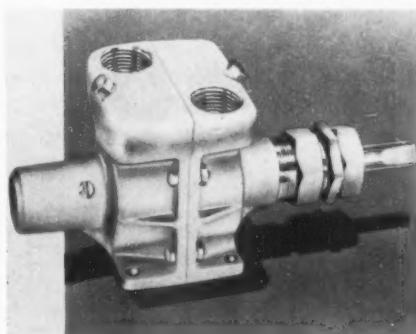
Rutley compounds are expressly developed to meet the specialized needs of the metal finishing industry. Specialized know-how is the intangible ingredient that makes Rutley compounds outstanding for quality and performance. They meet the highest standards for metal cleaning, burnishing and tumbling. This specialized know-how is just one of the many reasons why Rutley compounds do their work faster and better at less cost.

If you have a special problem why not let a Rutley technician help you solve it. For further information write for Rutley Bulletin H-2

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industries, inc.

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89/Circle on Readers' Service Card



tions involving corrosive and hazardous fluids that are chemically affected by molybdenum-bearing stainless steels. Chemically inert Teflon impellers and bearings are standard equipment in the pump. A choice of stuffing box assemblies includes plastic Teflon

packing or a fluid Teflon stuffing box seal, both of which are designed to prevent air ingress into the pump.

This reversible, positive displacement pump, with its twin rotors, produces a linear, non-surfing flow. Capacities are to 10 g.p.m. and pressures to 75 p.s.i. Higher pressures can be obtained by multi-staging. Pumps are available in all conventional types of mountings and with electric motor, air motor, pulley and chain drives.

90/Circle on Readers' Service Card

Abrasive Belt Cleaner

Henley & Co., Inc., Dept. MF, 27 Spruce St., New York 38, N. Y.

Hapomit, an abrasive belt cleaner of West European origin, is now avail-

How to IMPROVE YOUR PLATING OPERATIONS with SEYMOUR BRIGHT NICKEL

TO OBTAIN THIS DEPOSIT USE THIS SEYMOUR BRIGHT NICKEL PROCESS

*Type	Solution	Active	Method	Deposit
BRIGHT	C	Warm	Yes	Still Decorative
BRILLIANT	NC	Warm	Yes	Still Barrel Decorative Specification
ULTRA BRILLIANT	CK	Warm	No	Still Barrel Decorative Specification
NORMAL NICKEL	R	Cold	—	Barrel Decorative
BLUISH TINT	NR	Cold	—	Barrel Decorative
DEEPER BLUE	RS	Cold	—	Barrel Decorative

(*) For best results use these solutions with SEYCAST 99% cast anodes. Write for SEYMOUR bulletins giving complete details.

SEYMOUR BRIGHT NICKEL PROCESSES efficiently deposit on steel and ferrous alloys, on brass and nonferrous alloys and on zinc-base alloys which have been previously copper-plated.

They give you these important features: —

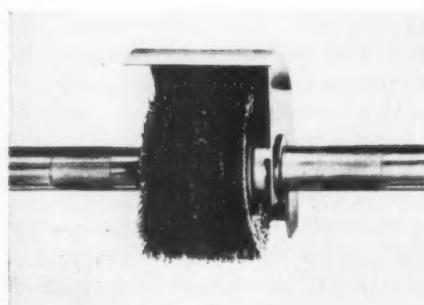
- GREATER THROWING POWER to successfully plate deeply recessed articles.
- HIGH DUCTILITY (in all but the "CK" process) which permits further fabrication after plating.
- MINIMUM OF CONTROL with easy operation and freedom from hydrogen pitting.
- SAVINGS in time and money because active surfaces require no reactivation, cleaning or wiping before chrome plating.



THE SEYMOUR MANUFACTURING CO.

4 FRANKLIN STREET, SEYMOUR, CONNECTICUT

91/Circle on Readers' Service Card



able in this country. This new hand tool is designed to restore the cutting power of clogged abrasive belts, and increases their useful life by 30%.

When gradually applying the hand brake, the rotating steel wire-brush takes all waste material out of even

heavily clogged belts in a few seconds. The belt cleaner is low-priced (about \$13) and makes the use of abrasive belts more economical.

92/Circle on Readers' Service Card

Valve Actuators

*Fulton Sylphon Div., Robertshaw
Fulton Controls Co., Dept. MF, Box
400, Knoxville 1, Tenn.*

A complete line of all-metal actuators for control valves for use under difficult conditions are designed for both pneumatic and hydraulic control systems.

The new actuators are available with suitable valves as complete control units, or as additions to existing



valve installations. Some are designed to function either "air to open" or "air to close" and are easily reversible in the field.

For use in highly corrosive atmospheres, one model is manufactured with stainless bellows and stem. Its frame is made from cold rolled steel which has been cadmium plated. It is available in three ranges of signal pressures: 3 to 15 p.s.i.; 6 to 30 p.s.i., and 9 to 45 p.s.i. Possessing a maximum thrust of about 3,000 pounds, the actuator is compact in size, measuring 17 9/16" in length and 8 5/8" in diameter. One unit, available "air to close" only, is fabricated completely of stainless steel.

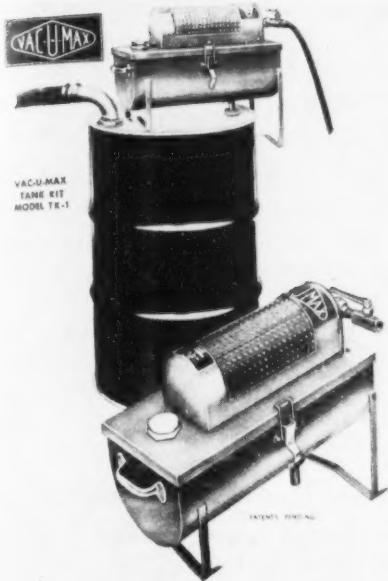
The line of actuators also includes smaller models and those for use in less critical situations.

93/Circle on Readers' Service Card

Fluid Transfer

*Vac-U-Max Sales Co., Dept. MF, 1
Montgomery St., Belleville 9, N. J.*

Vac-U-Max Tank Kit offers a simple, fast and safe means of pick up and transfer of fluids into standard sealed drums or larger tanks. It will fill a 55 gallon drum in less than 90 seconds. Solvents and chemicals for reclaiming or disposal are safely handled without explosion or other hazard. The unit is completely portable and easily moved from drum to drum. The device uses a simple aerodynamic principle with no moving parts. Compressed air passing through a jet venturi creates a constant high-suction vacuum. This unit is mounted on a float chamber housing an overflow cut-off.



When mounted on a standard drum, the flanged tube with neoprene gasket fits neatly into the smaller (3/4") bung opening and the joint is sealed by the gasket without requiring a threaded connection. A 2" elbow is provided which, when screwed into the larger (2") bung, makes a connection for the suction hose. Adapters for 2", 1 1/2", 1" or 3/4" hose are available. The same unit, or slight modification of same, may be easily adapted for use on larger tanks of virtually any capacity.

The high vacuum developed in the unit, (up to 16" high) produces the same vacuum in the drum or tank, into which the fluid is drawn. When nearly full, and fluid level reaches the end of the connecting tube, a small amount is siphoned through the tube to the float chamber. The overflow cut-off valve is actuated, breaking the vacuum and the fluid in the chamber drains back into the drum or tank filling it to the top. The unit can then be removed for reuse. Special units can be furnished for handling corrosive or gaseous fluids.

Standard units are also available for use on standard 30 and 55 gallon open top drums for handling solid materials or wastes, sludges, metal chips or powdered and granular materials.

94/Circle on Readers' Service Card

Stainless Steel Thermostat

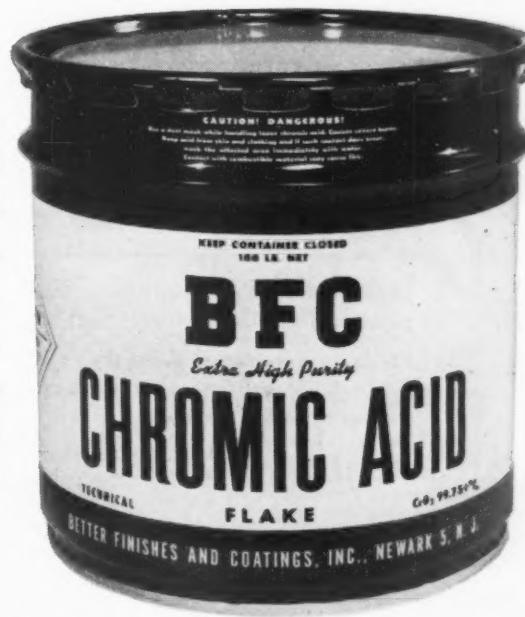
Fenwal Inc., Dept. MF, Ashland, Mass.

For corrosive applications, a new



*we always put
the **END** product **FIRST!***

The industry's newest plant—an incentive system that pays off on quality production. And every batch checked to be double sure it meets our extra-high-quality shipping standard. You'll see the difference when you start using BFC Chromic Acid. Why not—soon?



BETTER FINISHES & COATINGS, INC.
268 Doremus Ave., Newark 5, N.J. • 2014 E. 15th St., Los Angeles 21, Calif.

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thermostat is fabricated entirely from 316 stainless steel. For additional corrosion resistance, all exterior joints are heliarc welded. Because of its special construction, the stainless steel Thermoswitch unit, model 18000-26, is especially suited for service in 5 per cent H_2SO_4 at temperatures up to 120°F. (or in higher concentrations at lower temperatures), acetic acid vapors, halide solutions, alkaline solutions, and other materials to which 316-type stainless is resistant.

The unit is supplied with coupling-head mounting having a 1/2-14 pipe thread for direct threading into a tank or pipe wall. Contacts open above the control setting. Control temperatures



are adjustable over a range of -100 to + 400°F., and short-time overshoot by as much as 100 degrees will not affect reliability. Current rating is 10 amp., 115 volts AC, or 2 amp., 115 volts DC. The cartridge is 5/8 in. in diameter,



It's still around, Sonny, but you can't see it. It's broken up too fine. That's the way it is with oil, grease, drawing compounds, stamping compounds, and other soils removed from metal parts in a tank of . . .

Cowles NS SOAK CLEANER

No Scum on the cleaning tank to foul cleaned metal coming out. Clean it with Cowles NS Soak Cleaner and it stays clean.

For more information about the emulsifying power of Cowles NS Soak Cleaner for soak-tank cleaning before plating, enameling, other finishing . . .

Send this coupon for Technical Bulletin.

Cowles Chemical Company
7014 Euclid Avenue
Cleveland 3, Ohio

Please send Cowles NS Bulletin

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Company _____
Address _____
City _____ State _____



Chicago, Ill.
Sewaren, N. J.
Skaneateles Falls, N. Y.

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and has an immersed length of 3 in. The thermostat will control within 2°F. in a well-designed system.

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BUSINESS ITEMS

Milton Nadel Becomes General Manager of Certified Plating Co.

Milton Nadel has recently been appointed general manager of Certified Plating Co., a division of Berkeley Industries, Jersey City, N. J. For the past ten years Mr. Nadel has served as supervisor of metal finishing for Berkeley. Prior to that, he was general



Milton Nadel

manager of the plating division of Atlantic Aircraft in Long Island, New York, and previously to this he was associated with Special Chemical Corp. and J. B. Williams & Co. in New York.

Mr. Nadel is an active member of the A. E. S., having served as president of the New York Branch for many years. Certified Plating Co., located at 500 Grand St., Jersey City, N. J., is specially geared for the mass production chromium plating of tubing, wire goods, and flat stock, utilizing fully automatic plating lines to serve various industries.

Gumm Chemical Appoints Clark

Frederick Gumm Chemical Co., Inc., 538 Forest St., Kearny, N. J., manufacturers of Clepo cleaning and stripping compounds, announces the appointment of Charles B. Clark to represent them in the Western New York territory. Mr. Clark's address is 1329 Calkins Rd., Pittsford, N. Y. Phone: Hillside 5-2203W.

Officers Named at Lea Mfg. Co.

At the annual Lea Mfg. Co. stockholders and directors meeting held on February 26, 1957 the following officers and directors were named:

Earle W. Couch — president and assistant treasurer.

Richard P. Crane — senior vice-president.

Henry L. Kellner — vice-president.

William D. Starr — treasurer and assistant secretary.

Ellsworth T. Candee — secretary.

Marion G. Lynch — controller.

Other executive personnel are: D. F. Mosher, vice-president and manager of Lea-Michigan, Inc., Detroit, Mich.; Kergan Wells, secretary and manager of Lea Mfg. Co. of Canada, Ltd., Scarborough, Ont.; Frank Anderson, managing director, Lea Mfg. Co. of England, Ltd., Buxton, Eng.

Alpha Plastics Appoints Six New Distributors

Alpha Plastics, Inc., Livingston, N. J., manufacturer of rigid polyvinyl chloride pipe, announces the appointment of six stocking distributors who will carry the firm's line of pipe, fittings and valves.

In carrying the entire line, the new distributors, Mayer-Malbin, Astoria, L. I., N. Y., John Wilfert, Inc., Brooklyn, N. Y., Ward Bros. Mill Supply,

Lockport, N. Y., *J. Heller & Sons*, Newark, N. J., *Keenan-Cashman*, Bayonne, N. J., and *Missouri-Kansas Supply Co.*, Kansas City, Mo., will be able to offer a complete PVC package for handling corrosive fluids.

Hartwell Names McCulloch Representative

J. S. McCulloch, Jr. of Baltimore, Md., is a newly-appointed representative for *H. N. Hartwell & Son, Inc.*, Boston, Mass. He will be the firm's exclusive agent in New Jersey, Eastern Pennsylvania, Delaware, Maryland and Virginia.

Mr. McCulloch attended the Plastic Fabricating Institute at the Bolta Co. in Lawrence and is well qualified to advise and consult on the application and installation of PVC. He brings to the company many years of experience in dealing with corrosion problems in industry and is available to companies in his territory for advice in corrosion control.

Changes at Carborundum

William B. Summers, *The Carborundum Co.*'s coated abrasives field sales manager on the Pacific Coast, has been transferred in the same capacity to the Cleveland-Pittsburgh districts. He succeeds *F. M. Mansberg* who resigned to accept the position sales manager for *Kolcast Industries, Inc.*, Cleveland, Ohio.

Summers will work out of the company's offices in Cleveland and Pittsburgh and will direct coated abrasive sales activities in both districts. He was educated in the public schools of Buffalo and Canisius College, Buffalo, and obtained wide production experience in the aviation industry from 1940 to 1944. After a hitch in the U. S. Marines he joined the company in 1946 and has progressed from sales engineer to senior sales engineer, district sales engineer, to coated abrasive field sales manager in the Pacific District.

Gumm Appoints Fusco to Additional Territory

Frederick Gumm Chemical Co., Inc., 538 Forest St., Kearny, N. J., manufacturers of Clepo cleaning and stripping compounds, announces the appointment of *Albert G. Fusco* to represent them in the Southern New Jersey territory; he will continue to represent Gumm in New York City. Mr. Fusco's address is 48 Alden Ave., Valley

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a TRIAL BAR of
K260 G
STAINLESS STEEL
BUFFING
COMPOSITION
**OUTSTANDING FOR
CUT AND COLOR IN
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POLISHING and BUFFING COMPOSITIONS
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Stream, L. I., N. Y. Office phone: RE 2-0677. Home phone: Curtis 5-9750.

Leonard Sax Elected President of American Buff Co.

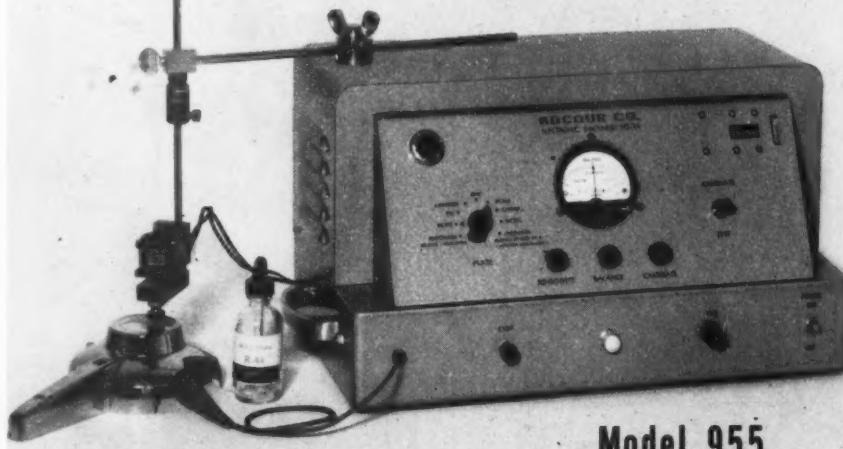
The election of *Leonard Sax* to the office of president has been announced by the *American Buff Co.*, Chicago.

With broad experience in the practice of law and public accounting, Mr. Sax came to the company in 1946. Starting with basics, he familiarized himself with manufacturing operations and procedures in all departments, learning the business thoroughly. His close work with the sales force kept him abreast of the practical problems of the metal finishing trade. At the time of his election as president, Mr. Sax was secretary-treasurer of the firm. He will now direct the activities



Albert G. Fusco

KOCOUR Electronic Thickness Tester



Model 955

A NEW MODEL . . . to solve your plating thickness problems!

Here's the New Model 955 . . . the answer to your plating thickness problems . . . a single instrument with a wider application than most other methods. And in addition, human error is virtually eliminated . . . operation is simple and automatic . . . readings are direct . . . accuracy 90-95% . . . results are reproducible . . . average test requires about one minute.

NEW Calibration feature ensures "long term" accuracy!

The accuracy of a thickness test can be no better than the accuracy of the method used. The Kocour Electronic Thickness Tester Model 955 gives you direct readings with an accuracy of 90-95%. Furthermore, with the new Calibration feature used in conjunction with Kocour Thickness Standards, you can not only check the accuracy, but calibrate the instrument to automatically correct slightly high or low readings. In addition any malfunctions due to a defective component will be indicated. Don't risk the quality of your product any longer . . . get the details on the New Model 955 today!

Ask for a demonstration or 15-day Free Trial!

KOCOUR CO.

Pioneers in Control for the Plating Industry

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CHICAGO 32, ILLINOIS

of the firm's three plants from the Chicago office on South La Salle St.

Behr-Manning Co. Names Merrill a Vice-President

Henry R. Merrill, since 1955 general sales manager of Behr-Manning Co. of Troy, N. Y., a division of Norton Company, has been appointed vice-president in charge of sales.

Merrill has been a director of the coated abrasives and pressure-sensitive tape manufacturing firm since 1954, and serves also on the directorate of Behr-Manning (Canada) Ltd. Born in Glens Falls, N. Y., he was graduated from Phillips Exeter Academy and, in 1929, from Yale University. He joined the firm in 1930 and rose through various sales assignments until his ap-



Leonard Sax



Henry R. Merrill

pointment in 1953 as assistant general sales manager.

Cleanite Products Appoints Distributor

Cleanite Products, Inc., of Philadelphia, announces the appointment of Textile Chemical Co. of Reading, Pa. as distributors of their chemical specialities in the four state area of Pennsylvania, Maryland, Delaware and New Jersey. Textile will handle the complete line of alkaline cleaners, pickling acids, paint strippers, etchants, de-oxidizers, rust inhibitors and emulsion cleaners, and maintains warehouses at Front and Spruce Sts. in Reading and at 1409 Germantown Ave. in Philadelphia.

Formation of Plastic Coating Firm Announced

Formation of a new industrial plastic coating firm, Polykote, Inc., with production facilities and offices at 877 Addison Road, Cleveland, 3, Ohio, is jointly announced by James R. Jones, Jr., president, and The R. W. Renton & Co. This company was formed by the purchase of the existing coating facilities of Renton with the intention of expanding industrial protective coating services in hot and cold dip plastisol, vinyl sheet linings, epoxy, urethane and Neoprene coatings.

Associated with Jones are Bob Renton, president of The R. W. Renton & Co., and K. M. Keller, president of Keller Products, Inc., Division of The Macco Chemical Co.

Prior to this business venture, Jones was with The Claremont Pigment Dis-



James R. Jones, Jr.

ersion Corp. and Ferro Corp., having been associated directly with sales and manufacturing as experienced in the plastic industry for the past seven years. He is an individual member of The Society of Plastic Industries and an active member of The Society of Plastic Engineers.

Parker Announces Appointments

The following appointments to the sales-service force of *Parker Rust Proof Co.* were announced recently.

D. A. Golby and *J. E. Lewis* have been assigned to the South Central Region office with headquarters in Cleveland. Mr. Golby will live in Pittsburgh and cover accounts in that area. Mr. Lewis will cover accounts in northern and central Ohio.

W. N. Jones has been transferred from the research and development department to the sales department, where he has been assigned to the Cold Forming Division. He will be operating out of the Detroit Office.

R. E. Covert has been assigned to the Central Region office with headquarters in Detroit. Mr. Covert will cover accounts in Detroit and its environs.

Stanley Chemical Appoints Sales Manager

Valentine B. Chamberlain, Jr., has been appointed sales manager of *The Stanley Chem. Co.*, a subsidiary of The Stanley Works, located in East Berlin, Conn., succeeding *Arthur B. Sherry*, who resigned.

Mr. Chamberlain, who joined The Stanley Works in 1941, has been assistant sales manager in charge of national accounts. He had been a sales

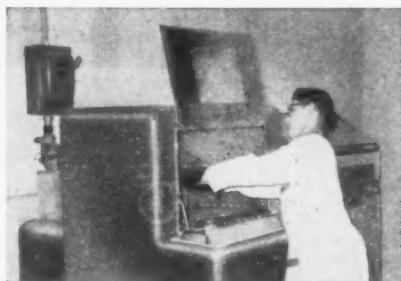
KLEM PRODUCT OF THE MONTH

KLEM-FILM

A new vinyl plastic protective coating that can be sprayed or brushed on paint spray booths. This new product, "Klem-Film," can



be peeled off, removing paint deposit with it and leaving the booth clean. It offers several other advantages. (1) It dries extremely fast. (2) It is white in color, providing reflective light in the booth. (3) It will not support combustion when dry. (4) It has unusual tensile strength, peeling off in large sheets and speeding the job. (5) It does not lose its elasticity even when subjected for a long period to heat as high as 290°F. "Klem-Film" can be applied to other equipment than spray booths to protect them in use and in storage.



YOUR SURFACE FINISHING PROBLEMS . . . can be solved by Klem engineers. Our complete lab is equipped to duplicate almost any industrial situation, determine the cause of difficulty and suggest the formula and procedure for your operation.



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He's in your area to help you. The next time he calls at your plant, take advantage of his specialized experience and training in metal surface cleaning and preparation. If you have a problem he may be of help to you on the spot, if not he'll use the KLEM-PLAN to present the facts to our lab technicians.

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Dearborn, Michigan El Monte, California

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representative for Stanley Chemical for ten years.

A graduate of Deerfield Academy, Williams College and Roosevelt Aviation School, he rose from private to captain in the army air force during World War II. He served in the African Theater for two years.

Exolon Co. Announces Appointments

The Exolon Co. of Tonawanda, N. Y. announces the appointments of *Daniel F. O'Connor* as sales manager and *Harvey J. Robillard* as manager of sales engineering. Mr. O'Connor has been with the company since 1939, except for four years during World War II when he worked in Naval Intelli-



Daniel F. O'Connor

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60% WITH

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Bright Copper!

This new revolutionary High-Speed Process is your answer to an easier controlled, faster, more economical Bright Copper Plating method. Plating specialists developed this process to help you achieve top quality, more profitable plating solutions capable of increasing your production 30 to 60 percent with your present equipment. You can cut your cost and do a better plating job in a very short time by communicating with us, at once!

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Harvey J. Robillard

gence in the Near East countries. His responsibilities with the firm have included production, traffic and many sales assignments. He will now give full time to building up a distributor organization through the United States and Canada for the sale of abrasive products of the company. Branch offices are maintained in New York, Chicago and the Boston area.

Mr. Robillard has a Bachelor of Science Degree in Ceramic Engineering from the New York State College of Ceramics at Alfred University. He worked for three years at Bay State Abrasive Products Co. before joining Exolon in 1951 to handle problems in technical sales. He will have charge of the sales engineering laboratory and

assist customers with problems pertaining to abrasive products.

New Appointments at Metal & Thermit Corp.

The appointment of *R. W. Couch* as manager of electrochemical research and development has been announced by *Metal & Thermit Corp.*, Rahway, N. J.



R. W. Couch

Mr. Couch is a graduate in chemistry of Wayne State University. He has been with the company and its former subsidiary, *United Chromium, Inc.*, in various research and supervisory capacities since 1941. In his new post he assumes the overall management of the company's Detroit, Michigan laboratories.

He is a member of the American Chemical Society and the American Electroplaters' Society.

Carl R. Gloskey has been appointed to the post of manager of a recently



C. R. Gloskey

formed *Process Development Division*. He is a graduate chemist of Rutgers University and, prior to serving in the Air Force in World War II, was a process control technician with R. L. Walkins Co. He has been with the company's research and development department since 1946.

Dr. F. A. Lowenheim has been ap-



Dr. F. A. Lowenheim

pointed technical advisor to Dr. C. K. Banks, vice-president of research and development.

Dr. Lowenheim has been with the company since 1936 as a research chemist and research supervisor. He holds a Ph.D. degree from Columbia University where, from 1930 to 1934, he served on the staff as an assistant in chemistry. From 1951 to 1955 he was associated with Stevens Institute of Technology as a visiting lecturer in chemistry.

He is the author of a number of papers and handbook chapters on electroplating and is a member of the American Chemical Society, The Electrochemical Society, American Electroplaters' Society, National Association of Corrosion Engineers and other associations in the finishing fields.

Sel-Rex Corporation Acquires New Building in Nutley

The acquisition, on long term lease, of a two-story brick building encompassing approximately 40,000 square feet, in Nutley, N. J. has been announced by *Sel-Rex Corp.*, manufacturers of precious metals processes,

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A growing number of imitators is testimony to the superiority of BLACOSOLV. The recognized stability, versatility and economy of BLACOSOLV degreasing solvent is the result of continuing research and development.

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A view of the new Sel-Rex Corporation building in Nutley, New Jersey. Encompassing approximately 40,000 square feet, the two story brick structure will house the firm's executive offices, Rectifiers and Filter manufacturing, Precious Metals Production and Experimental Laboratories, and a complete Pilot Plant for sample Precious Metals Electroplating.

metallic power rectifiers, airborne power equipment, liquid clarification filters, and metal finishing equipment and supplies.

The new building will house the firm's executive offices, manufacturing, experimental laboratories, and a complete pilot plant for sample precious metals electroplating.

In addition to the new plant and executive offices, the company also maintains branch-offices and warehouses in Detroit at 18040 James Couzens Hwy., and Chicago at 5865 North Lincoln Ave. A new, West Coast branch-office and warehouse is scheduled to be opened in Los Angeles within the next two or three weeks.

The current expansion program will also entail the addition of several staff-level engineers, as well as sales and service engineers to supplement the existing field force, according to the firm's personnel department.

Bergin Appointed Product Manager for Lea Mfg. Co.

Francis X. Bergin has been appoint-



Francis X. Bergin

ed product manager for *The Lea Mfg. Co.* He will be in charge of all sales and services on liquid abrasive compounds for polishing, buffing and burning, and related spray buffing equipment, for both Lea of Waterbury and Lea of Michigan. Mr. Bergin will supervise the activities of both the Waterbury and Michigan sales organization

where liquid buffing compound applications are concerned.

Metal & Thermit Re-Assigns Sales Territories

In order to provide improved service to customers of its *Chemicals, Metals and Plating Products Division*, *Metal & Thermit Corp.* has recently re-assigned a number of sales territories in Michigan, Northern Ohio, Indiana, Western Pennsylvania and West Virginia.

I. M. Weiss and *L. B. Quirk* will now serve customers in Michigan formerly called on by the late *J. J. Hanney*. Mr. Weiss will operate from Grand Rapids and Mr. Quirk will continue to cover from Detroit other areas of Michigan as well as certain customers in Northern Ohio. *Robert Stewart* of the East Chicago office will assume coverage of Northern Indiana formerly assigned to Mr. Quirk and Mr. Hanney.

K. D. Ford will continue to operate in Northern Ohio, Western Pennsylvania and West Virginia, assuming responsibility for additional plating

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Zinc-Brite
TRADE MARK REG'D.

Top-quality, low-cost

ZINC SOLUTION
PURIFIER

Eliminates heavy metal impurities, including copper.
Prevents harmful build-up of carbonates.

A complete cleansing treatment: — No other purification measures necessary.

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MIST MUZZLES

THESE PLASTO ANTI CHROME SPRAY BALLS
WILL REDUCE
CHROMIC ACID CONSUMPTION UP TO 50%



USE IN CHROME, STRIP AND PICKLE TANKS

○○○○○○○○○○

- HOLD SPRAY DOWN
- DO NOT DRAG OUT
- DO NOT STICK TO RACK
- KEEP ENTIRE SURFACE COVERED
- KEEP HEAT IN TANK
- LAST INDEFINITELY

○○○○○○○○○○

55 BALLS PER SQUARE FOOT OF SURFACE.
PRICE — \$100 PER THOUSAND

W. D. FORBES CO.
129 - 6th AVE. S.E. MINNEAPOLIS, MINN.

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and coating accounts covered up to now by Mr. Weiss. The Eastern Indiana area formerly covered by Mr. Ford has been re-assigned to *E. W. Rehme* and *J. G. Walker*. Mr. Ford will operate in cooperation with *Frank Haas* who is responsible for sales of all the firm's chemicals, metals and plating products in the Pittsburgh-Cleveland area.

Stauffer to Expand Plant in Nevada

Stauffer Chemical Co. announces that it plans to expand its caustic soda-chlorine plant at Henderson, Nevada by the addition of facilities to produce solid caustic soda. The engineering work has been completed and it is anticipated that the new project will be built and operating within the next four months. Total new investment will be several hundred thousand dollars.

The company has been a basic producer of caustic soda at Henderson since 1945 but heretofore has shipped only liquid grades from that unit.

Zander Elected to Board of Kelite

William E. Zander has been elected to the board of directors of *Kelite Corporation*, manufacturers of industrial chemicals and steam cleaning



William E. Zander

equipment, according to an announcement. He is a director of Arrowhead and Puritas Waters, Inc., and was formerly senior vice-president and director of Rheem Mfg. Co.

NRC Appoints Wm. C. Long Manager of New Detroit Office

The opening of a Detroit district sales office is announced by NRC Equipment Corp., Newton, Mass. *William C. Long* has been appointed manager of this office, which is located at 19185 James Couzens Highway, Detroit 35,

Mich. This office will serve all of Michigan as well as the Fort Wayne and Toledo areas.

A graduate of Newark College of Engineering, Mr. Long has had 15 years of experience in metallurgical engineering. He is a member of the American Society for Metals and the Engineering Society of Detroit, and lives in Rochester, Michigan.

Western Coating Relocates

Western Coating Co. has moved from Elyria, Ohio to a new and larger plant in Royal Oak, Mich. on Stephenson Highway and 14½ Mile Road. The mailing address is P.O. Box 598, Oakridge Station, Royal Oak, Mich.

The firm manufactures a full line of protective strippable coatings and Maskcoat No. 2 a stop off for electroplating.

Chemical Products Corp. Announces New Assignments for Hawes, Allison

Following a meeting of the board of directors of the *Chemical Products Corp.*, the company announced the election of *Joseph S. Hawes* as vice-president in charge of lacquer sales, and of *Hugh B. Allison* as vice-president in charge of Chem-o-sol sales.

Mr. Hawes was long associated with

BOOKS FOR THE PLATER

Metallizing Non-Conductors

By SAMUEL WEIN



The present work deals with every known method for "metallizing" or the deposition of metals by electrolysis (plating) or non-conductors. It is divided into several sections, i.e., those processes which use chemical, mechanical and physical methods for treatment of surfaces for metallizing. In these groups the specific methods are chronologically reviewed and so the reader can very readily get a better idea of the progress made by the various workers in these arts. At the end is an alphabetical listing of contributors to the art, so that the serious workers can refer to the original sources of the information given in the text by Mr. Wein.

The text is prepared in a practical fashion so that the formulas given will be of material use and is the result of literature collected by the author for more than 25 years and which has been in use by a number of industrial concerns here in the United States and abroad.

PRICE \$2.00

Dictionary of Metal Finishing Chemicals

By HALL and HOGABOOM



This volume fills the need in the metal finishing field for a handy source of information concerning the chemicals employed. The technical and common names are listed in alphabetical order together with information as to physical appearance, chemical formula, molecular weight, melting and boiling points, and solubility. Available grades, types and sizes of shipping containers are also given, all of which are of help in identifying the contents of unlabelled packages which are found in most plating rooms. A special section contains tables of degrees Baumé and specific gravity for solutions of a great many salts. Various solutions and dips employed in the finishing department may be easily controlled by the use of a hydrometer and these tables. The authors, editors of the *Plating & Finishing Guidebook* and associate editors of *Metal Finishing*, as a result of their familiarity with the requirements of the industry, have compiled a reference volume which belongs on the shelf of every metal finisher.

PRICE \$3.00

BOOK ORDERS PAYABLE IN ADVANCE

METAL FINISHING
381 Broadway, Westwood, N. J.



Joseph S. Hawes



Hugh B. Allison

New England Lacquer Co. before it became affiliated with Chemical Products Corp. in 1947 and was formally merged in 1954. He became a specialist in lacquers for insulated wire and will now direct the firm's entire sales activity in the field of specialized industrial and decorative coatings.

Mr. Allison joined the firm in 1948. For almost a decade he has been closely associated with the development of the rapidly growing group of polyvinyl dispersions (plastisols) which the company custom formulates and manufactures.

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Brush Electronics Names Distributors

Appointment of four new distributors for its Surfindicator, an instrument for measuring surface roughness, and its Metal Monitor, an instrument for classifying metals, has been announced by the *Brush Electronics Co.*, Cleveland.

Named were the *Syracuse Supply Co.* with headquarters in Syracuse and branch offices or permanently stationed salesmen in many cities in upper New York state; *Metallurgical Products Co.*, which covers portions of Massachusetts and Connecticut from its headquarters in Brookline, Mass.; *Reynolds, Inc.*, Providence, covering all of Rhode Island and northeastern Connecticut; and *Frey Industrial Supply Co.*, Los Angeles, which will cover southern California and Arizona.

Walworth Names Wallace

John C. Wallace has been named vice-president of engineering for the *Walworth Co.*, a leading manufacturer of valves and fittings. He was formerly

PROSEAL 1 and 3
An aqueous solution of a combination of Proseals 1 & 3 imparts a conversion chromate finish on electro-deposited zinc and when sealed and leached with Proseal A-2 or 2-B produces a bright finish with a minimum of iridescence. This chromate finish has extremely high resistance to corrosion and to the formation of corrosion products. For free technical information, write us today. Also send for free copy of "Promat's Progress."

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vice-president and general manager of Hunt-Spiller Mfg. Corp., Boston.

NEW BOOK

Symposium on Properties, Tests, and Performance of Electrodeposited Metallic Coatings

Published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 1957. Price: \$3.00. 129 pages, paper cover.

The extensive use of plated metals, particularly electrodeposited, makes this symposium of considerable interest to both producers and consumers of electroplated material. Recent advances in the field have broadened the use of electrodeposited metals so that they now may be found on products for the home, industry, building trade and the military.

The volume is extensively illustrated and contains comprehensive tabular data. Prepared under the auspices of

ASTM Committee B-8 on Electrodeposited Metallic Coatings, the Symposium contains the following significant papers:

Introductory Remarks — *W. L. Pinner*.

History of ASTM Committee B-8 — *William Blum*.

The Corrosion Behavior and Protective Value of Copper-Nickel-Chromium and Nickel-Chromium Coatings on Steel — *C. H. Sample*.

Evaluation of Methods Available for Measurement of Surface Luster of Electroplated Coatings — *G. B. Bowman*.

Recommended Practices for Cleaning Prior to Electroplating — *S. Spring*.

A Comparison of the Corrosion Behavior and Protective Value of Electrodeposited Zinc and Cadmium Coatings on Steel — *C. H. Sample, A. Mendizza, and R. B. Teel*.

Evaluation of Phosphate Coating over Electrodeposited Zinc — *A. L. Alexander*.

Evaluation of Testing Methods for Supplementary Coatings — *R. E. Harr*.

Atmospheric Exposure of Electroplated Lead Coatings on Steel — *A. H. DuRose*.

The Standard Salt-Spray Test — Is It a Valid Acceptance Test? — *A. Mendizza*.

Associations and Societies

AMERICAN ELECTROPLATERS' SOCIETY

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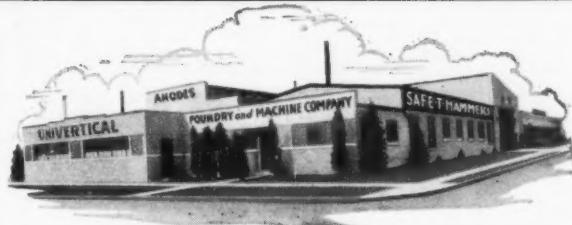
Twenty-three of the following twenty-seven technical papers will be presented at the technical sessions to be held at the *Sheraton-Mt. Royal Hotel*, June 16-20.

Levelling in Cyanide Copper Baths — A Further Study.

Brite and Semi-Brite Crack-Free Chromium.

Effects of Plating on High Tensile Strength Steels.

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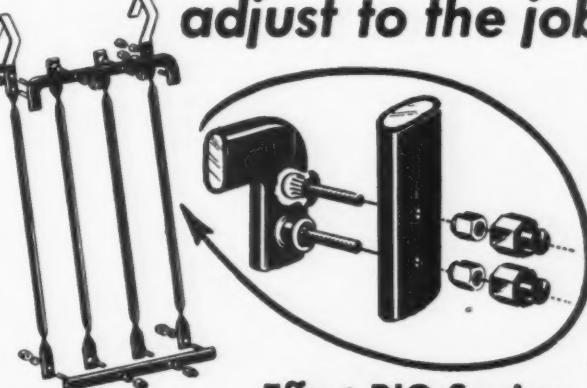
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Sealing of Anodic Aluminum Oxide Films.

Plating of High Density Tungsten-Base, Powdered Metal Alloys.

Nickel Plating on Nickel and Nickel Alloys.

The Influence of the Basis Metal on the Durability of Watts Nickel Deposit. Iridium Plating and Its High Temperature Oxidation Resistance.

Ultrasonics.

Surface Catalyzed Reduction of Copper.

Impurities in Chemical Bright Dip Solutions for Aluminum—Their Effect and Removal.

Barrel Plating.

A Study of Application Technique in the Use of Liquid Buffing Compound.

Corrosion and Materials of Construction in the Plating Room.

Further Studies in Nickel-Iron Alloy Electrodeposits.

Electrodeposits as Resists in Selective Heat Treating.

A Study of the Effects of Various Forming Electrolytes on the Anodic Film.

The Effect of Steel-Making Processes on the Properties of the Surface of Steel Plate.

Electroplating Chromium on Titanium. Factors Governing Buff Wear.

Analytical Methods for the Tracing of Quantities of Cyanide Compounds in the Plating Room Effluent.

The Role of Chromate Treatments in the Finishing of Aluminum.

Sisal Buffing.

Industrial Chromium Plating — a film.

Tentative Program

A brief summary of the tentative program follows:

June 16 — Sunday

1:00 - 9:00 P.M. — Registration

8:30 P.M. — "Get-Together" Party

June 17 — Monday

10:00 A.M. — Opening Session and Business Meeting

12:00 Noon — Metal Finishing Suppliers' Association Luncheon and Annual Business Meeting

2:30 P.M. — Technical Educational Program starts

8:30 P.M. — MFSA "Open House" — Dancing & Buffet

June 18 — Tuesday

Technical Sessions — All Day and Evening.

June 19 — Wednesday

8:00 A.M. — Morning Technical Session

11:00 A.M. — Laurentian Trip — Outing

8:45 P.M. — Floor Show and Dance

June 20 — Thursday

9:30 A.M. — Technical Session

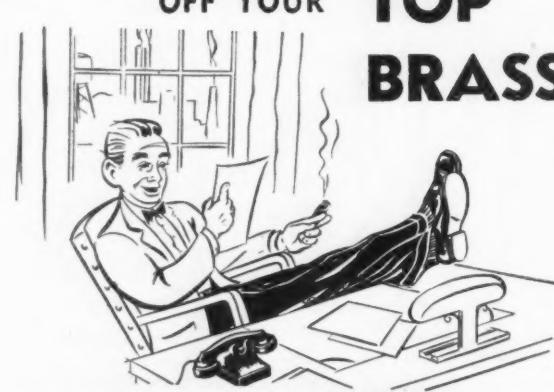
9:30 A.M. — AES Business Meeting

7:00 P.M. — Annual Banquet and Dance

M. F. S. A.

A. P. Munning, Executive Secretary

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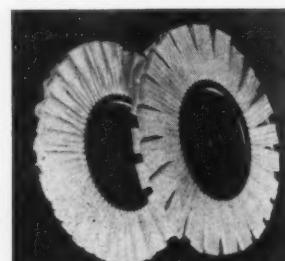
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of the Metal Finishing Suppliers' Association, announces that Jeff Carrique of Alloycraft, Ltd. has completed arrangements for the M. F. S. A. meetings to be held during the convention period. These will include a Board of Trustees' meeting, Annual Business Meeting and Luncheon open to all members, and the "Open House" Party Monday evening for the entire convention attendance. The M. F. S. A. will elect 7 new trustees and nominations should be sent to Mr. V. Finston, The Meeker Co., 1629 South 55th Ave., Chicago 50, Illinois, who is Chairman of the Nominating Committee.

Hotel Reservations

Hotels are reported to be filling up rapidly and anyone interested in attending should write at once regarding accommodations desired (giving arrival and departure times and names of people who will occupy the rooms) to the Montreal Tourist and Convention Bureau, Inc., Suite M30, Sheraton-Mt. Royal Hotel, 1455 Peel Street, Montreal, Canada.

Newark Branch

The last meeting of the fiscal year was held March 15, 1957 with 86 in attendance, including Executive Board members *Francis Eddy*, *Herberth Head* and *Clyde Kelly*, as well as members from three other branches, *Manny Sharlin* (Philadelphia), *Maurice Perkins* (Los Angeles) and *Art Carlson* (New York).

During the business meeting following movies presented by *Howard Cobb*, two applications were accepted and eight members were elected: *Abe Adler* of Sel-Rex Corp., *Robert Bieling* of H-VW-M, *Philip Bishop* of Independence Plating; *Oliver Johnson* of U. S. Metals Refining Co., *Robert Klopman* of H-VW-M, *Albert Martini* of Sel-Rex Corp., *LeRoy Neilson* of H-VW-M, and *William Tillis* of the Curtiss Wright Aeronautical Corp. *Edsell Faulman* was transferred to Chicago, and the resignation of *Atillio Bisio* was accepted. The sum of \$25.00 was voted to be contributed to the Newark Chapter of the Red Cross.

New officers of the branch were

elected and installed by National First Vice-President *Francis Eddy* as follows:

President — *William Grigat*.
1st Vice-President — *Gustave Bittrich*.

2nd Vice-President — *Dodd S. Carr*.
Librarian — *Fred Meyer*.
Sargent-at-Arms — *John Banta*.
Treasurer — *George Wagner*.
Secretary — *Don Foulke*.
Board of Managers — *John Gumm*,
Clifford Struyk, *George Reuter*.
Delegate — *W. Andrew Wesley*.
Editor of Newark Sparks — *Flavio LaManna*.

Dr. Wesley was elected a delegate to fill the unexpired term of *Mr. Cobb*, who resigned. Other delegates elected in November include *George Wagner* and *Don Foulke* with *Dodd Carr*, *Robert Horrocks*, and *Gerry Lux* as alternates. *William Grigat* presented *Clifford Struyk* with a Past-President's pin and congratulated him on a very successful year.

Dr. Carr introduced *Paul Topalian* who discussed the *Tiarco Corp.*'s methods and successes with respect to

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the direct plating of chromium on aluminum and titanium.

C. F. Ivins, Jr., of the Hanson-Van Winkle-Munning Co. presented the chief paper of the evening on "Power for Plating" which was well received. He discussed the importance of the control of rectifier current, explaining full, half, and no-control and the type of equipment involved in each case. Motor operated tap switches and stepless auto-transformer controls, the induction regulator, and the use of saturable core reactors were discussed. The talk concluded with a review of rectifier types, copper oxide, selenium, germanium and silicon, including an analysis of the future use of each.

After a considerable question and answer period the meeting adjourned with a rising vote of thanks for the two speakers.

D. Gardner Foulke
Secretary

Pittsburgh Branch

The Pittsburgh Branch held its March dinner-meeting in the Gateway Plaza. Approximately 30 attended din-

ner before the business meeting. President *Myron Ceresa* opened the meeting by asking for roll call of officers. Two applications for membership were then read. They were for *John R. Haines* of Pennsalt and *Richard F. Higgs* of U. S. Steel Research Labs.

The annual election of officers was held and the results are as follows: President, *I. H. Schram, Jr.*; 1st Vice-President, *R. J. Crain*; 2nd Vice-President, *W. F. Pizoli*; Secretary, *W. F. Stevens*; Treasurer, *R. E. Woehrle*; Librarian, *W. J. Musmanno*; Delegates, *E. J. Smith, Myron Ceresa and R. A. Wooster*; Alternate Delegates, *R. H. Schindler, R. E. Varner and R. J. Goldbach*; Board of Managers, *Myron Ceresa*. The installation of the new officers will take place at the May 1 meeting of the branch.

Bob Burford, chairman of Ladies Night stressed the need for vigorous support of the affair. The committee has kept the cost per person the same as in previous years although prices have increased; therefore, only a large turn out will insure a successful evening financially for the Branch. Steak

is on the menu and *Lee Kelton's* orchestra will provide music for dancing after dinner.

The branch voted to donate fifty dollars to the newly formed Ladies Auxiliary. The Organization Committee selected by the women present at the February meeting were as follows: *Mrs. R. A. Wooster*, Chairman; *Mrs. R. H. Schindler, Mrs. J. W. Mechtry, Mrs. J. Kelley and Mrs. R. M. Burford*. The committee meeting in March was to select a slate of candidates and write by-laws for their organization. *Bob Wooster* and *Rex Goldbach* gave the ladies a helping hand at their meeting.

Due to illness, *S. L. Johnson*, the regularly scheduled speaker was unable to attend the meeting, so *R. W. Reed* consented to replace him. Both gentlemen are with Minnesota Mining and Mfg. Co. Librarian *Dick Woehrle* introduced Mr. Reed who gave a short lecture on "Surface Preparation for Plating." Following the lecture, Mr. Reed showed a very interesting film showing various polishing installations, applications and results. The group had several questions for Mr. Reed

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following the movie, which he very
ably answered.

Fred Stevens
Secretary

A.E.S.

A group of 30 electroplaters and others interested in plating met at the Carlton Terrace Coffee Shop in Roanoke, Va., on March 8, for an initial meeting to determine the interest in electroplating in the southwestern Virginia and northern North Carolina section of the country. The meeting was the result of efforts on the part of T. R. Boggess of the Norfolk and Western Railroad to get electroplaters in this section of the country together for discussions of mutual problems. Mr. Boggess of the Washington section and Dr. Nelson F. Murphy of the Syracuse section of the A.E.S. explained the aims and advantages of membership in the Society and discussed the possible formation of a local chapter. It was decided that if interest was maintained at its present high level for several meetings efforts will be made to organize a local section.

Following the dinner the group was addressed by *Carl Wetherspoon* on the subject of cyanide gold plating. Mr. Wetherspoon, who has wide experience in the plating of gold, is now employed by the Polyscientific Corp. of Blacksburg, Virginia. He discussed the many difficulties and properties of gold plating. The talk was followed by some rapid fire questions and answers. The group adjourned at 9:30 P.M. after a satisfying evening.

Nelson F. Murphy

Central Michigan Branch

The Central Michigan Branch held a dinner meeting on March 12th at Hotel Hayes in Jackson with 27 members present.

The business session involved the presentation of a slate of officer candidates for the coming year, to be voted on by mail and announced next month; and a discussion of a change in meeting nights.

The program was a very interesting talk by *Ezra A. Blount*, editor of *Products Finishing*, on "Impressions of the

Japanese Finishing Industry." A social hour concluded the meeting.

Earl D. Creese
Publicity Secretary

Chicago Branch

The March meeting of the Chicago Branch was held March 8, 1957, at the Western Society of Engineers. New officers for the coming year were elected, as follows:

President — *Dr. Russel Harr*.
1st V.P. — *Scott Modjeska*.
2nd V.P. — *Charles Geldzahler*.
Librarian — *Joseph Corre*.
Secretary-Treasurer — *Paul Glab*.
Board of Managers — *Edward Stanek, Donald Chiz, Everett Hodges*.
Delegates — *Clyde Kelly, Dr. Russel Harr, Paul Glab*.

Alternates — *Matthew Dossinger, Arthur Bartman, Simon Gary*.

The speaker of the evening was *Dr. G. H. Kissin* of Kaiser Aluminum and Chemical Corp. Dr. Kissin's subject was Anodizing Aluminum for Decorative and Functional Applications. In his talk he covered very thoroughly the theory and technic in anodizing and

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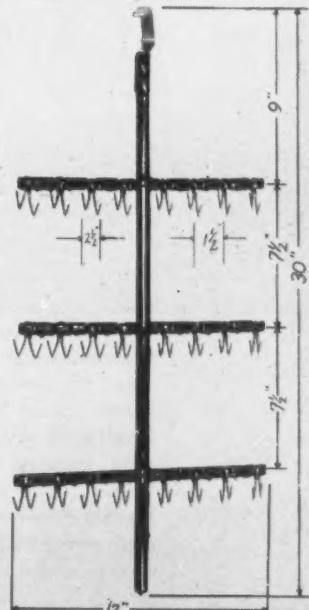
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dyeing. Samples showing the effect of varying the anodizing time, dye concentration, and temperature of the dye, were passed out for observation during the talk. Dr. Kissin's presentation stimulated an extremely interesting question and answer period after which the meeting was dismissed.

J. C. Corre
Publicity Chairman

Indianapolis Branch

On March 6, 1957 thirty members and guests met at the Continental Hotel to enjoy a roast beef dinner. Marshal Whitehurst opened the meeting with introductions and asked for the minutes of February meeting. Roman Bender made a motion which was seconded and carried to accept the secretary's report as read. The treasurer's report by John Holland was accepted as read in a motion by Quention Shockley which was seconded and carried.

Loren Stevens, in keeping with sustaining membership night, introduced A. H. DuRose of the Harshaw Chemical Co. who is on the AES Research

Committee. Mr. DuRose proceeded to review the projects of the research committee. Much interest was shown on who was working on each project. This review indicated that universities and colleges were doing the largest part of the active projects.

The meeting adjourned at 9:20 P.M.

Paul Freeman
Secretary

Los Angeles Branch

Los Angeles Branch Society held its annual election of officers at its March 13th meeting in Rodger Young Cafe. The following men were chosen to represent the branch in the 1957-58 term:

President, *George Magurean*, process engineer with Electronics Industry, Inc., Pasadena, Calif. He succeeded *E. Truman Stoner*.

First Vice-president, *Norman McEwan*, plating technician with Virtue Bros., Los Angeles.

Second Vice-president, *George Hetz*, manager, Plating Supply Division, Mefford Chemical Co., Los Angeles.

Secretary, *Emmett H. Babcock*, process engineer, Convair, Inc., Pomona, Calif.

Treasurer, *Harvey Hunt*, technical sales representative, Alert Supply Co., Los Angeles.

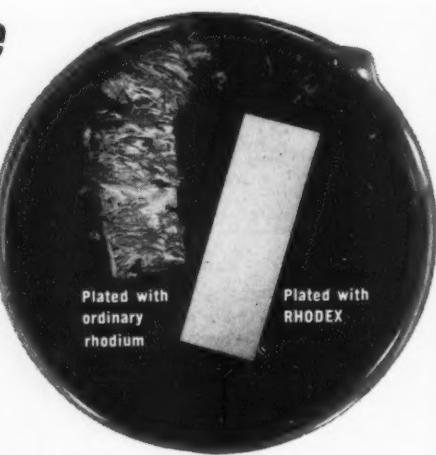
Librarian, *Frank Virgil*, L. H. Butcher Co., Los Angeles.

The only new name on the list of officers is that of Mr. Hunt. The others were moved up from positions they filled in the 1956-57 term.

Six candidates for delegates to the Montreal convention in June figured in the balloting, with the three obtaining the largest number of votes named as delegates and the other three as alternates. The delegates are *Glenn Beckwith*, Kwik-Set Locks, Inc., Anaheim, Calif.; Mr. Babcock and Mr. Virgil, Los Angeles. Chosen as alternate delegates were *Tony Stabile* of Associated Plating, Los Angeles; *Earl Coffin* of L'Hommedieu & Sons Co., Los Angeles staff; and Mr. Hetz.

The new officers will be installed at the April 10 meeting, at which time President-Elect Magurean will also name his choices for the posts of

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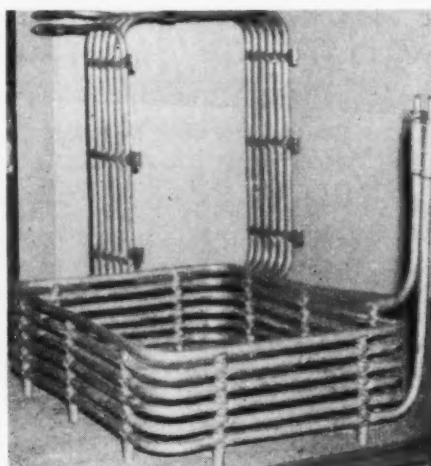


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METAL FINISHING, May, 1957

sergeant-at-arms and chairman of the research committee.

In his capacity as incumbent first vice-president and director of the membership drive, Magurean reported that the 1956-57 campaign (April 1, 1956, to March 13, 1957) had produced 50 new members. First prize, a \$25.00 savings bond, went to *Marty Barsoon* for bringing in the largest numbers of new members—10; and second prize to *Milton Weiner*, who was awarded a \$10.00 merchandising certificate for coming in second with four new members. *Paul Franke* produced three, and the other 33 were divided among 20 different members. A similar 12 month drive is to be pursued by the branch between April 1, 1957, and mid-March, 1958, with the new first vice-president, *Norman McEwan*, in charge.

Twelve new members were initiated at the March 13 meeting, either in person or by proxy standing in for them. The newcomers are: *E. S. Bennett*, Anchor Plating Co.; *H. C. Ray*, Satex Co.; *Myron Miller*, *Richard Golden*, and *William Fulmer* of Electrochem Corp.; *Fred H. Kietka*, Certi-

fied Chrome Products; *J. W. Hunkla*, Hightower Co.; *Willard R. Bell*, Chemical Research Co.; *Emanuel Barker*, Douglas Aircraft Co.; *R. E. Davis*, Hanson-Van Winkle-Munning Co.; *M. Crittenden*, J-V Mfg. Co., and *Gene Golden*, Electronics Plating Co.

The 1957-58 campaign got off to a good start when the applications of four new members were submitted, including *Jack Rassett*, Turco Products; *Louis S. Bartley*, North American Aviation; *George H. Peters*, Kelite, Inc.; and *Clarence R. Mortensen*, Kwikset-Locks, Inc.

George Hetz, Co-chairman of the 1960 Los Angeles convention committee announced appointment of *Larry O'Neill* of L'Hommedieu as entertainment chairman.

President Stoner reported that arrangements had been concluded for holding the branch's June meeting as guests of the Rheem Mfg. Co. in Fullerton, Calif. A dinner and short meeting will be held in the cafeteria of the company's new bumper manufacturing and plating factory. This will be followed by a guided tour through extensive new plating department for in-

spection of the automatic plating, polishing and pickling facilities which were installed last fall (see Jan., 1957, METAL FINISHING, Page 111).

ANNUAL BANQUET A SUCCESS

Los Angeles Branch held its 27th annual educational session and dinner dance at Hotel Ambassador, Los Angeles, on Saturday, March 23, with two outstanding internationally known figures of the plating industry on the speaker's program.

Addressing the West Coast branch for the first time were National A.E.S. President *Dr. Samuel Heiman*, chief chemist and research director of the Philadelphia Rust Proof Co., Philadelphia, Pa.; and *Dr. Walter R. Meyer*, president, Enthone, Inc., New Haven, Conn., former technical editor of METAL FINISHING.

The one-day session was divided into three parts—a technical session from 9 a.m. to 12:30 p.m.; a noon day luncheon and entertainment period from 1 to 3:30 p.m.; and a dinner dance from 7 to midnight. Near record breaking attendance of 200 for the

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technical session, 185 for the luncheon, and 625 for the dinner dance were reported by Reservations and Registrations Chairmen *Harold P. Wanamaker* and *Lawrence M. Henderson*.

Los Angeles members and their guests from San Francisco and other parts of the Pacific Coast were unanimous on the point that the papers presented by Drs. Heiman and Meyer and *Leo Missel* of Lockheed Aircraft constituted the finest all-around technical program that the branch has offered in the 27 annual sponsorings of educational sessions.

The first speaker, Dr. Heiman, presented a talk on "Some Practical Plating Problems," which he amplified with slides of graphs and bath formulas. His address, in the main, centered on a variety of shop problems which have come to his attention in recent years, problems which, he explained, are typical to platers in the East as well as on the West Coast. He discussed the problems chiefly in the form of explanatory comment in connection with illustrated slides.

Before launching into his formal talk, Dr. Heiman discussed the National Society and its corporate set-up and the functioning of the headquarters office in Newark, N. J. Dr. Heiman urged Los Angeles Branch, as the fourth largest in the Society, to assume a more active role in National Society affairs by attempting to get some of its members in national office or on national committees.

Later in the month Dr. Heiman met with and addressed members of A.E.S. branches in San Francisco, Portland, Oregon, and Seattle, Wash., and the new branch in Vancouver.

The topic of Dr. Meyer's talk was "Seeing Electroplating Solutions in Action." The most interesting phase of the presentation was a series of absorbingly interesting slides which showed the action of chemicals in a solution inside the tank. The audience was able to see anodes and cathodes in a cyanide copper plating solution dissolve before their eyes, and how changes in the solution take place when a wetting agent is added.

Other slides depicted inside-the-tank action of a chromium plating solution with a lead anode and copper cathode; and a stainless steel anode in a zinc sulphide solution.

The third speaker on the morning technical program was *Leo Missel*, research engineer of the Missile System Division, Lockheed Aircraft Co., Van Nuys, Calif., who presented a paper on "Electrodeposition on Titanium Alloys."

The noon-day luncheon was attended by 185 members and guests. Among the guests were four San Francisco Branch members, including *Justin Call*, president; *Arthur Schwartz*, secretary; *Berton Trygstad*, board member; and *Frank Huntington*, past-president.

Also in attendance were the Branch's only two distaff members—*Mrs. Vonna Ott*, owner of a Pasadena plating job shop; and *Miss Marjorie Farmer*, research engineer with North American Aviation, Inc., Los Angeles. Miss Farmer had been a member of Hartford, Conn., A.E.S. Branch, for 12 years before transferring her member-

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shop to Los Angeles Branch in 1954.

Featuring the noon-day luncheon was the distribution of a score or so of door prizes and the annual story-telling contest. The two distinguished visitors from the East Coast each won a prize—a carving knife for Dr. Meyer, and a silver serving spoon for Dr. Heiman.

Lawrence O'Neil served as chairman of the luncheon and *Lawrence Henderson* as master-of-ceremonies in the story-telling contest. A three-man jury was named to decide the winner. Among those who went to the microphone to regale the audience with stories were *Herold Kroesche*, *Jack Schultz*, *Harold Smallman*, *Ira Hayes*, *Louis Fried*, *Carrol McLaren*, *George Hetz*, *Larry O'Neil*, *Larry Henderson* and *Carmelo DeLucca*.

The jury voted the winner to be Mr. DeLucca, with second prize going to Mr. Hayes. DeLucca's winning story dealt with a Nazi storm trooper officer who became confused with the equipment of one of his troops and dealt out some undeserved punishment. Hayes

came in a close second with a story about a rattlesnake in Texas who found out who his real friends were when disaster threatened to overwhelm him.

The dinner dance (from 7 p.m. to mid-night) was attended by 625 members, their ladies and guests. Among the guests was *Mrs. Joan Wiarda* of Chicago, vice-president and national advertising manager of *Finishing Publications, Inc.*

Branch members who manned the committees that arranged the 27th annual educational session and dinner dance, were: Chairman Ex-Officio, *L. Truman Stoner*, branch president; general chairman, *Harvey K. Hunt*; educational, *Emmett H. Babcock*; reservations, *Harold P. Wanamaker*, chairman, *Lawrence A. O'Neil*, and *Dexter Haldin*; Door Prizes, *Glen J. Beckwith*, Chairman, *Kenneth Baum*, and *Stoner*; Publicity-Printing: *Fred A. Herr*, chairman; *K. C. Johnson*, and *G. Stuart Krentel*, Entertainment, *C. P. Simon*, and *William Thomas*; Luncheon and Registration, *George A. Peters* and *L. N. Henderson*.

N. A. M. F.

Word has been received of the appointment of five members of the NAMF to the newly created Government Electroplating Industry Advisory Committee. This quintet will represent the job plating industry in top level Government-industry planning, according to *John Palik, Jr.*, NAMF president of Cleveland, Ohio. The "captive" plating industry whose representatives have not been disclosed, will also serve on the EIAC.

Job plating industry representatives include Mr. Palik, National Plating Corp., Cleveland, O.; *Mariano Ranno*, Imperial Plating Co., Brooklyn, N. Y.; *Silvio C. Taormina*, Platers' Research, Inc., New York, N. Y.; *Edwin J. Driscoll*, Driscoll Plating Co., Chicago, Ill.; and *David J. Griffin*, Birmingham Plating Works, Birmingham, Ala.

The EIAC, scheduled to hold its first meeting in Washington, D. C. in early April, will seek to accomplish the following main objectives: (1) an equitable distribution of nickel and other metals or minerals, (2) a "fair" price for nickel and other metals, and (3) a

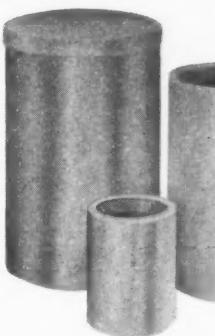
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more realistic base period for purposes of allocation.

Creation of this committee by the Dept. of Commerce is the result of close to two years' struggle by the Association for job plating industry recognition. The job platers' fight was spearheaded by NAMF nickel committee chairman Ranno, NAMF president Palik, and NAMF technical adviser Taormina, backed by job shop platers throughout the country.

European Group Tours U. S. Plants

Twenty-one European metal finishers were guests of U. S. plating shop owners and managers recently in a study-tour arranged through a New York travel association. The group visited more than a dozen job and captive shops in their 20-day junket which took them to New York, Cleveland, Detroit, Chicago, Baltimore and New England.

The itinerary was planned with the help and cooperation of the National Association of Metal Finishers. Local NAMF affiliates who played host to the visitors included the Masters Electroplaters Association of New York, Plating Trades Association of Ohio, Chicago Electroplaters Institute, and the Plating Institute of Michigan. Detroit and Chicago Branch members of the A. E. S. also took part.

Composed of German and Austrian plating experts, the visitors marveled at U. S. automated plating machines. Plants and shops visited were: Albert's Plating Works, Inc., Brooklyn, N. Y.;

Platers' Research, Inc., N. Y.; Pyro Metal Finishing, Inc., Newark, N. J.; Lycoming Div., AVCO, Bridgeport, Conn.; Nutmeg Chrome Corp., West Hartford, Conn.; National Research Corp., Cambridge, Mass.; General Hard Chrome Corp., Advance Plating Co., Industrial Plating Co., Manufacturers' Plating Co., Cleveland, Ohio; Elyria Plating Co., Elyria, Ohio; several plants and shops in the Detroit, Mich. area; Allied Research Products, Inc. and Almag Corp., Baltimore, Md.; Northwestern Plating Wks., Adolph



Unique Barrel Plating operation is described to touring European metal finishers by J. Robert Greenwell, (gesturing) president, Reliable Plating Co., Chicago, and NAMF vice-president, during Windy City visitation by 21 representatives of the German and Austrian plating industry. L. to r.: Albert Koehler, vice-president, Erhard & Soehne BmbH, Schwabish Gmuendi, metal finishers and suppliers to automotive industry; Greenwell; CEPI chairman Harold W. Baker, Electro Galvanizing Co.; and Ludwig F. Osthushenrich, owner, Dr. Hesse & Cie, Bielefeld, metal finisher and plating chemicals manufacturer.

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S. C. Taormina, MEPA executive secretary was in charge of arrangements in the New York area; Lewis Glassner, CEPI executive secretary, made plans for the Chicago tour while J. Robert Greenwell, president, Reliable Plating Co., and NAMF vice-president, took charge of the Windy City visitation.

In Detroit, Mich., NAMF'er Glen H. Friedt, Jr., United Platers, Inc., directed activities assisted by PIM executive secretary James D. Mueller and local branch members of the AES. The Cleveland area plans were mapped by NAMF president John Palik, Jr., National Plating Corp., and G. David Zeile, Jr., PTAO executive secretary. Joseph Eisenberg, Almag Corp. and a NAMF director, was in charge of the Baltimore program.

NAMF president Palik lauded the many NAMF and AES members who made the study tour possible. He thanked participating firms for their cooperation and praised them "for encouraging and enhancing a free exchange of metal finishing knowledge between this country and Germany."

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

Two-Day Conference on Power Rectifiers

Final plans for the conference on Power Rectifiers, sponsored jointly by the Semiconductor-Metallic Rectifiers and Industrial Power Rectifiers Committees of AIEE, to be held at the Morrison Hotel in Chicago on June 4th and 5th were agreed upon at a recent meeting of the executive committee in charge of this conference. A total of four sessions will be held during which 16 papers will be presented.

The highlight of the conference will be a panel discussion on application and maintenance. The symposium will begin with a short presentation on experience in each of the following fields:

1. Low voltage electro-chemical
2. Low voltage plating
3. High voltage electro-chemical
4. Steel mill auxiliaries and main drives

to be made by an eminent user in the field. These four men plus two representatives of the manufacturers will comprise the panel which will answer

questions from the floor. Informal discussion from the audience drawing upon their experience in these fields will be welcome and encouraged.

All papers presented at the conference will be published in a bound booklet which will be available at the registration desk at \$4.00 each.

Since a large attendance is anticipated, the Constitution Room, which will accommodate 500 people, has been reserved for the technical sessions.

News from California

By Fred A. Hess



The A. J. Lynch Co. terminated 26 years of operation at 2420 Enterprise Street, Los Angeles, in mid-March by moving to new office and warehouse facilities at 4560 E. 50th St. in Vernon, Calif., a Los Angeles industrial suburb.

President *W. W. Cadwallader* reported to METAL FINISHING that the new plant contains 31,000 square feet of floor area and represents an investment of approximately \$135,000. The firm produces raw materials for paint and handles chemicals for the plating and other industries.

Glenn Beckwith reports that he has resigned as vice-president and general manager of Metallon Products, Los Angeles, manufacturers of plumbing parts, to assume the post of manager of special sales for Kwik-Set Locks, Inc., in Anaheim, Calif., where he works under general sales manager *Robert Yerkes*.

Beckwith was affiliated in executive capacities with Metallon from mid-1949 until April 1, 1957. Earlier this year, he reported, arrangements were concluded for integrating the Los Angeles operations of Metallon Products with those of the Cold Metal Products Co. of Canfield, Ohio, with Metallon becoming a division of Cold Metal Products Co., and terminating the former's production activity of California.

Beckwith's reluctance to leave Southern California and move his family to the Mid-West, was the principal factor,

he revealed, in his leaving Metallon and joining the Kwik-Set organization.

Kay Lab of San Diego, Calif., producers of DC instruments, industrial television equipment, and absolute DC power supplies and meter calibrators, reports a company name change to Kintel, San Diego. Factory and laboratory are located at 5725 Kearny Villa Road, San Diego.

George Magurean (1957 president of Los Angeles Branch, A.E.S.), recently joined the technical staff of Electronics Industries, Inc., of Pasadena, Calif., as a process engineer. The firm produces printed circuitry and transformers for that field. It also assembles circuitry parts into compact package units. The Pasadena plant is equipped with copper, gold, nickel and rhodium solution facilities.

Magurean transferred from a post as process engineer with the Quality Control Laboratory of Convair, Inc., Pomona, Calif., to assume the Pasadena engineering position. Prior to that he served in similar technical capacities with U. S. Spring & Bumper Co. (now Rheem Automotive Mfg. Co.), and Redi-Strip Co. of South Gate, Calif.

Richard M. Phillips has joined the plating division of the Curtis-Wright Co. in North Hollywood, Calif., where expanded facilities were installed in March and April for plating aircraft

engines in chromium, copper, nickel, tin, lead, hard chromium, and silver. Phillips served the previous 2½ years with Spartan Engineering Co., Los Angeles, specialists in the hard chromium and iron plating of railroad Diesel engine liners and, prior to that, with Grand Central Aircraft in Glendale, Calif.

The Smoot-Holman Co., manufacturers and finishers of industrial and commercial lighting fixtures and porcelain enamel plumbing parts, recently installed automatic spray facilities in its Inglewood, Calif., plant to replace hand spray operations, and now handles upward of 2,700 lighting fixtures per day in its finishing department. Automation, it is reported, has upped production from 40 lamp sockets for each gallon of enamel to 160.

Delos N. "Dee" Eldred, head of Eldred Laboratories, Los Angeles, died at his home in Arcadia, Calif., on March 22 following a heart attack which came as the climax to more than a year of treatment for a heart weakness which necessitated his retirement from active business early in 1956. He was 62 years of age.

The funeral was held on March 26 with a number of members of Los Angeles Branch of the A.E.S. paying their respects to a beloved member. Mr. Eldred was a past-president of the branch and had been active in its affairs and a regular attendant at meetings until his illness began a year ago.

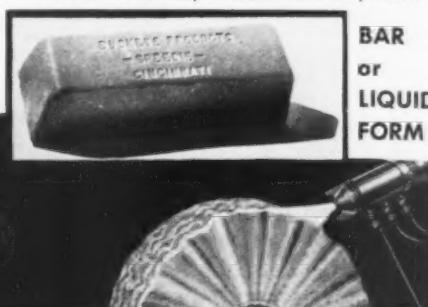
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He served for 26 years as technical representative to the Southern California plating trade for the Dupont Co., with headquarters in El Monte, Calif. In 1946 he organized Eldred Laboratories which served in a consultant capacity to plating shop operators. His partner for the past 2½ years was *Don Baudraud*.

Juston B. Call, plating foreman for the General Electric Co. in San Francisco and president of San Francisco A.E.S. Branch, missed by one day being caught in the turmoil incident to the earthquake which struck San Francisco on March 21. He had left home for Los Angeles the previous day to attend the annual educational session of Los Angeles Branch.

Carroll McLaren of the L'Hommedieu Co.'s Los Angeles staff, is quite proud of his unbroken attendance record at the annual educational sessions of Los Angeles A.E.S. Branch. His presence at the 27th annual affair on March 23rd was his 26th consecutive one. He missed only the first — in 1931 — when he was not yet a member of the branch.

Dick Richardson reports that he has resigned from the plating staff of Commercial Plating Co., Los Angeles, to assume the post of shop foreman for Hill Plating Co., in Long Beach, Calif., which is operated by *S. W. Mashburn* and *W. N. Stephens*. The firm manufactures lighting fixtures. Originally a partner with Mashburn in the Long Beach shop, Richardson sold his interest several years ago, and thus has returned now to the scene of

his earlier activity in the plating field.

K. G. Tarczynski has joined the plating division staff of the Rheem Automotive Manufacturing Co. in Fullerton, Calif., where a four million dollar automatic plating installation for finishing automobile bumpers was placed in operation last December. Tarczynski's most recent affiliation was with the Harvey Machine Co., in Torrance, Calif. Prior to that he had directed the plant operations of Superchrome Engineering Co. of Los Angeles for a number of years.

Gwynne Edson, formerly active in the plating division of Kearfott Mfg. Co., Newark, N. J., has joined the plating staff of the Hughes Aircraft Co. in El Segundo, Calif.

R. T. Jones, sales manager for the international division of Beckman Instruments, Inc., Fullerton, Calif., recently returned from a six weeks business trip to Puerto Rico, Cuba, Brazil, Venezuela, Chile, Argentine, Columbia,

Peru and Mexico. He also made the preliminary arrangements for a technical course to be held in the company's Fullerton, Calif., plant for training Latin American dealer service personnel.

The *E. S. Gilmore Co.* has announced appointment of *George H. Wilson* as Pacific Northwest sales engineer for carbon and graphite products originating in Crescent Carbon Corp.'s recently opened new plant in Rosamond, Calif. The company's products include electrolytic cell anodes for the chemical processing industry and graphite electrodes for electric furnaces.

Charles E. Pretzinger, a district sales engineer in the Pangborn Corp.'s Pacific Coast division, has been named Pacific manager, with headquarters in Pasadena, Calif. Pretzinger succeeded *Ralph M. Trent*, the firm's western manager since 1947, who has been named as executive vice-president with headquarters in the Hagerstown, Md., main offices.

Western Metal Congress and Metal Show

The 10th Western Metal Congress and Metal Show held in Los Angeles Calif., March 25 through the 29th drew an attendance in excess of 50,000 at the technical sessions in the Ambassador Hotel and the exhibit of 450 booths in the Pan Pacific Auditorium.

Thirty-one firms from various parts of the United States that manufacture equipment and chemicals, or provide

technical services to the metal finishing division of the metal industry, sponsored booths at the Los Angeles Show. A brief description of the products displayed by plating industry suppliers, and the names of company representatives in attendance is given herewith:

American Chemical Paint Co., Ambler, Pa., exhibited treatments, as used in development of the all aluminum

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JUNE 16 - 20, 1957

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automobile radiator; in retarding corrosion on oil well equipment; chemical treatments for titanium, zirconium, magnesium; and for industrial cleaning. In attendance were *F. P. Spruance, Jr.*, vice-president and general sales manager; *J. H. Geyer* manager of research and development; *J. D. Breen*, advertising manager; and *G. H. Williamson*, West Coast manager.

Baron Industries, Los Angeles, Calif., presented the new line of airless paint spraying equipment; a paint pump, a newly introduced paint pump featuring low maintenance on pumping abrasive type pumps; as well as degreasers and ovens. Present were *W. R. Hamilton*, *J. T. Hogan*, *F. H. MacQuarrie*; *E. Nord*, president of Bede Products, Amherst; *L. Silver*, divisional manager of Balerank, Inc., Cincinnati, O., and sales engineers from Baron Industries Los Angeles and San Francisco districts.

G. S. Blakeslee & Co., Cicero, Ill. On exhibit in this booth was an ultrasonic degreasing machine, a paddle wheel metal parts washer, solvent recovery still, and degreasing solvent. *A. L. Bashe*, sales manager, and *R. A. Kully*, advertising manager from the home office in Cicero headed a booth staff of West Coast sales engineers.

Buehler, Ltd., Evanston, Ill., exhibited a new ultrasonic cleaning device designed for the cleaning of metallurgical samples. The unit featured the use of two transducer cells and two cleaning cells which, it is claimed, assures a high degree of cleaning without time consuming and expensive changes of solvent. In attendance were *Adolph J. Buehler*, president; *Erich*

Weidner and *Frank Restivo*, sales engineers; and *Cornelius Johnson*, metallurgist, all from the Illinois main plant.

Curtis Division, Corborundum Co., Jamestown, N. Y., presented a new model vertical platen grinder; a polishing lathe; a conveyor through-feed grinder and polisher; and various other types of grinding and polishing units. In attendance were *F. Hopke*, sales manager, *A. Dary*, methods engineer, of New York; and a number of Los Angeles, San Francisco and San Diego sales engineers.

Chainveyor Corp., Los Angeles: Exhibited in this firm's booth was a full sized conveyor combining vertical up and down curves with horizontal curves. Manning the booth were *P. T. Rauen*, president; *J. N. Rauen*, vice-president; *F. G. Birkhead*, chief engineer.

Clementina, Ltd., San Francisco, Calif., presented a gun for sandblasting; wet hone for cleaning critical tolerance parts; and portable cleaners were also on display. In attendance were *A. J. Cleary*, general manager; *V. P. Finigan*, assistant sales manager; and San Francisco and Los Angeles sales engineers.

Dayton Abrasive Products, Inc., Dayton, O., exhibited discs, sleeves, belts, cartridge rolls, spirals, square and cross pads.

Detrex Chemical Industries, Inc., Detroit, Mich.: Featuring the exhibit was a new automatic conveyorized ultrasonic degreaser which was operated in demonstrations throughout the Metal Show. Also shown in this booth were trichlorethylene degreasing solvent, cleaning compounds, degreasers, phosphate coating equipment and

chemicals. Present were *A. W. Stoddard*, advertising director; *W. F. Newberry*, sales director; *D. E. Williard*, sales manager, solvent division; *T. J. Kearny*, sales manager equipment division; *S. Jacke*, sonics specialist; *G. A. Jacobs*, regional manager.

Diversey Corp., Chicago, Ill.: Exhibits shown included a new deoxidizer for aluminum and aluminum alloys designed to remove oxide from heavily heat treated stock; copper and brass electro cleaner; reverse current cleaner; electro cleaner and surface conditioner for zinc base die castings; and various other products in the firm's line of cleaning compounds. In attendance were the following: *M. T. Bennett*, manager of the metal industries department; *T. H. Palmer*, assistant manager, both from Chicago; and sales engineers from northern and southern California.

Far-Best Corp., Los Angeles, Calif., displayed rust preventive oils and greases, cleaning compounds, detergents. Sharing this booth were *Sanford Products Co.*, Los Angeles, with displays of aluminum hard coating; *O. L. King & Co.* of San Francisco — oils and greases; *Eronel Industries*, plastic coatings; and *Allube Corp.* — additives and cutting oils. Present were *J. Johnson* and *L. and J. Shinn* of the *Allube Corp.*, *P. Dwyer* and *P. Garden* of *O. L. King Co.*; and *W. W. Farrar* of *Far-Best Corp.*

Grey Co., Inc., Minneapolis, Minn., presented a new paint pump for paint circulating systems; and a direct-from drum principle 10 gallon metallic paint pump which features complete circulation of metallic paints to the spray gun. *W. W. Bixby*, Los Angeles

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METAL FINISHING, May, 1957

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district manager; *C. D. Parr*, regional manager; and *C. E. Barnes* and *A. E. Perry*, district and branch manager in San Francisco were present to demonstrate the equipment.

Harshaw Chemical Co., Scientific Div., Los Angeles, Calif., presented freeze drying equipment, an ultrasonic generator, induction furnaces and ovens, metallographic laboratory equipment. Manager *E. Fraigun* and Chief Chemist *W. Porter* headed the demonstration staff.

International Nickel Co., Inc., New York, N. Y., exhibited a new type corrosion "push button" machine giving visitors a few answers to acid corrosion problems. Various uses of nickel in industry and science were featured in the exhibit. *A. G. Zima*, director of the company's West Coast Section, headed a staff of metallurgists and engineers from the Los Angeles and San Francisco areas.

Malayan Tin Bureau, Washington, D. C., showed new tin alloys, solders and other industries. Present from Washington were *L. W. Meekins*, director; *P. E. Davis*, development engineer; *J. I. Skinner*, public relations di-

rector, the latter representing the Tin Research Institute, Inc., Columbus, O.

Markel Co., Chicago, Ill., and Lake Chemical Co., exhibited protective coatings for protection of metal against scaling and corrosion at high temperatures, and for protection of metals during carburizing, decarburizing, annealing and normalizing at high temperatures. In attendance were Research Director *L. Aronberg*, Sales Manager *B. Lytton*; and Chemist *D. Lytton*.

Mayhew Products Co., Los Angeles, Calif., exhibited portable and stationary oil and solvent purifying units in various sizes from $3\frac{1}{2}$ to 60 g.p.m. *W. R. Mayhew*, general manager, and *W. M. Mayhew*, sales manager, were in attendance.

McKenna Laboratories, Santa Monica, Calif., displayed an ultrasonic cleaning system for cleaning watches and small precision parts. On display was a self-contained unit including rinsing and drying. *A. G. McKenna*, *W. McHenry*, *C. Harbold* and *Lajune Coffman* were present to demonstrate the equipment.

Merit Products, Inc., Culver City, Calif., sponsored a booth featuring

polishing units. On display was the firm's new type drum, a wide polishing drum for finishing metal sheets up to 72 inches; and drum and round-face wheels. In attendance were *W. G. Gillett*, production manager; *R. W. Bernstein*, development engineer; *M. Marsh*, sales manager; *H. Block*, manager.

Metal Improvement Co., Los Angeles; in conjunction with The Chromizing Co., and Bowman Chemicals, exhibited chromized parts that increase the electrical sensitivity of aircraft electrical relays; dry lubricant and shot peening machines. Vice-president *B. Adams* and *F. K. Landecker*, manager, headed a large staff of technicians in greeting visitors to this display.

Mido Products, Inc., Torrance, Calif., exhibited jointly in a booth with *Rampe Mfg. Co.* of Cleveland, O. Precision barrel finishers, tumblers, screen separating machines, and barrel finishing compounds were displayed. In attendance were *Herman Ey*, president, and *E. H. Ey*, sales manager of Mido Products; and *J. F. Rampe*, president of Rampe Mfg. Co., Cleveland, O.

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Ranshoff, Inc., Hamilton, O., presented a new two-in-one, side-by-side multi-process cleaning machine exhibiting features of the combination drum and conveyor type wash, rinse and dry equipment. Sample parts, work and tote pans processed in the machine were on display. In attendance were *J. M. Shelt*, field engineer; *R. C. Wiggin*, vice-president, and *R. M. LaBoiteaux*, representative, from the Hamilton home office.

Spar-Tan Engineering Co., Los Angeles, Calif. exhibited samples of a porous chromium process for which it is the exclusive western licensee. Present were *Fred W. Gartner*, sales manager; *George J. Moeller*, general manager;

ager; *Roger D. Moeller*, plant manager.

Speed-D-Burr Corp., Glendale, Calif. displayed representative units of its line of barrel finishing equipment, including a tumbling barrel, a hot sawdust barrel with mechanical elevator and separator, and various other samples of the company's line. In attendance were *Haskell J. Miller*, president, and sales and distributor representatives from San Francisco, Seattle and Portland.

Spee-Flo Co., Houston, Tex., exhibited its new units which spray paint without atomizing air. General Manager *G. Peters* of the Houston office headed a staff of booth attendants which included *R. L. Stevenson*, western regional manager, San Francisco; and representatives from Denver, Los Angeles and San Francisco.

Square Deal Machine Co., South Gate, Calif. exhibited a line of fully and semi-automatic polishing machines, along with literature to illustrate the full line of products produced by this firm. President *Phillip Greathead* was in attendance.

Turco Products, Inc., Los Angeles, Calif., had on display miniature tanks demonstrating a new aluminum conversion coatings. Also on display were production parts of titanium, magnesium, aluminum and steel that are being milled chemically. Another series of miniature tanks demonstrated the firm's line of phosphate coatings. In attendance were *C. F. Divine*, advertising manager; *D. T. Buist*, director of sales; *A. K. Beard*, sales manager; and a large staff of district and assistant district managers, and sales engineers.

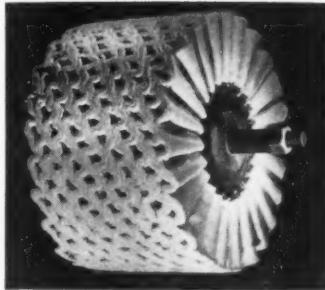
National Carbon Co., a Div. of Union Carbide and Carbon Corp. sponsored a booth featuring a com-

plete line of carbon and graphite products as applied to the metal industries. Company representatives and engineers from various sections of the country manned the booth in relays throughout the five days of the Metal Show.

Wyandotte Chemicals Corp., Wyandotte, Mich., exhibited new chemical processing products and metal cleaners for plating, painting, maintenance and manufacturing operations. Featured was a new low foaming spray cleaner for aluminum and magnesium, and a new cleaning and alkaline derusting compound. Present were *K. Kubis*, industrial sales manager, *T. Todd*, Los Angeles district manager; and technical sales engineers from the Southern California district.

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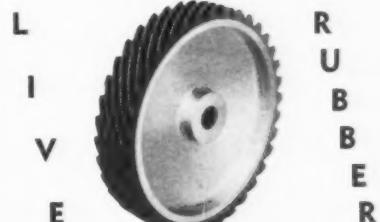
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750/375	6/12	Excel
940	32	Elec. Prod.
1500	15	Star
1500	30/50	Century
1500	40/65	G. E.
1500	65	Westinghouse
1500	70	Century
2000/1000	6/12	Chandeysson
2500/1250	6/12	Elec. Prod.
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- 1—5000/2500 Ampere, 9/18 Volt, Chandeysson, Synch., Exc.-in-head.
- 1—4000/2000 Ampere, 6/12 Volt, Chandeysson, Synch., Exc.-in-head.
- 4—3000/1500 Ampere, 12/24 Volt, Chandeysson, Exciter-in-head.
- 1—2500/1250 Ampere, 9/18 Volt, Electric Products, Synch., Exc.-in-head. 25°C.
- 1—2000/1000 Ampere, 6/12 volt, Hanson-Van Winkle-Munning.
- 1—1500/750 Ampere, 12/24 volt, Chandeysson, Synch., Exc.-in-head.

— ANODIZERS —

- 1—1000 Ampere, 40 Volt, Chandeysson, 25°C.
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Cleaning side has large loading hopper, cleaning, pickling, cyanide dip and rinse tanks, and 3 monel 14" x 36" cylinders with gears and hangers and 1/8" perforations; transfer hopper; 5 station motorized plating unit includes 6 lucite cylinders (1 a spare), 14" x 36" with 1/8" perforations; 5 Udylite Mallory rectifiers 750 amp. 12v./1500 amp. 6v. (220 v. 3 phase 60 cycle), 1 timer for each cylinder, automatic brightener addition unit, 2 Crown dryers with large Modine heater attached; plate-coils, rinse tanks; whole unit completely integrated with 3 - 500# electric hoists and 75 ft. electrical track. Good condition, immediate delivery. Inspection invited. Address: May 2, care Metal Finishing, 381 Broadway, Westwood, N. J.

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Per column inch per insertion	
1 time	\$10.00
3 times	9.00
6 times	8.50
Yearly (12 times)	8.00

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—USED EQUIPMENT AND SUPPLIES—

ELECTROPLATING
POLISHING
RUST PROOFING
CLEANING
ANODIC TREATMENT
ETC.

QUALITY EQUIPMENT

PRICED RIGHT AND READY FOR IMMEDIATE DELIVERY

PLATING EQUIPMENT

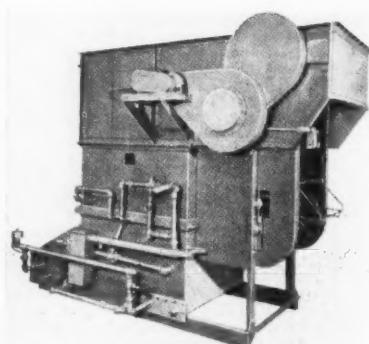
30 Plating Barrels: Crown — Udylite — HVWM — various sizes.
 1 HVWM Semi-Automatic Rubber lined Plating Unit: 33' long, 3½' wide, 3' deep with Reeves Variable Speed Drive and Mov-able Agitator.
 6 Semi-Automatic Plating Tank Units: Udy-
lite 20' — HVWM 20' — Crown 35' —
U. S. Galvanizing 12', 16' and 20'.
 1 HVWM 4 station Plating Barrel Unit: 36x14; rubber lined tank, rubber cylinders.
 40 Chrome Plating Tanks: 2' to 20' long lead lined with tank rheostats, rods, fume ducts, lead heating coils.
 175 Plating, Rinsing, Cleaning Tanks: as-sorted: wood, steel, lead lined, rubber lined. All sizes 2' to 16' long.
 150 Rheostats & Switches, assorted: 50 amps. to 2000 amps. All makes HVWM, Crown, Columbia, Holland, Udylite.
 10 Centrifugal Dryers: acid crocks, motor driven exhaust fans, fume blowers, complete acid and dip rooms, cleaning and washing tanks, plating racks and many other items.
 30 Rubber lined Nickel Plating Tanks: 2' to 12' long; with rods, rheostats, motor driven tank rod agitators, heating coils, etc.
 16 DETREX, BLAKESLEE, CIRCO, Steam, Gas and Electrically Heated Degreasers: 3' to 6' long, single dip and 3 dip type, with pumps, tanks, fume ducts.
 12 STEINER IVES and GEHNRICH Paint Baking and Drying Ovens: electric, all sizes; full automatic, recirculating type with controls, fans, blowers.
 CHANDEYSSON: 1000 amps to 5000 amps.
 HVWM: 500 amp. - 5000 amp.
 HOBART: 100 amp. - 2000 amp.
 COLUMBIA: 1000 amp. - 4000 amp.
 BOGUE ELECTRIC: 500 amp. - 3000 amp.
 AMERICAN GIANT: 250 amp. - 4000 amp.
 ANODIZERS: 5 to 40 volts; 100-3000 amps. all above complete with motors, panel board, starting equipment; separately ex-
cited, interpole type.
 ALL SIZES — TUMBLING BARRELS: Abbott — Baird; complete with stones and steel balls.

ALL EQUIPMENT IN STOCK
INSPECTION INVITED
All quoted subject to prior sale.

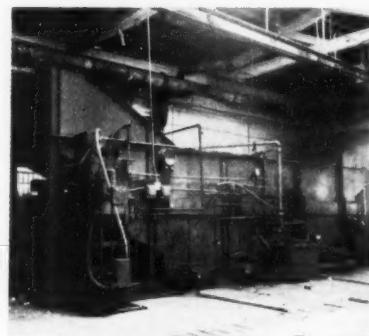
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BLAKESLEE



DETREX

1—Blakeslee Model THTL Serial #6760 motorized de-
greaser, complete with 12" x 18" barrels or baskets. Note
vapor generating sump is off-
set from the machine proper,
cutting down evaporative
area, as well as size of the
machine to fit into space provided.
Degreaser provides for
liquid immersion, followed
by rinse in hot concentrated
vapors. The machine is load-
ed and unloaded at one end.
Plus still.

1—Detrex Solvent Degreaser
Model VM 325.

3-Stage Operation, Vapor-
Spray-Vapor, Richard Wil-
cox Conveyorized Accom-
panying Still, Large Capacity
Production, Clearance for
Work 3' x 3'. Another Mono-
rail can be added for Double
Production. This Degreaser is
28 foot x 6'.

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UNITS MAY BE SEEN ON OUR PREMISES IN NEW JERSEY.

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BROOKLYN 11, NEW YORK

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AUTOMATIC MACHINES FOR SALE

1—Hanson-Van Winkle fully automatic plating machine, elevator type, double row; 40' long x 12½' wide x 10½' high; 32 stations; arms are on 24" centers with 36" lift. Tanks are 42" deep x 60" wide. Machine is complete with tank linings, anode rods, submerged terminals, pipe coils, control panel, etc. This machine and tanks are in excellent condition having been used only 1½ years. The machine is suitable to any plating or anodizing cycle.

1—Hanson-Van Winkle fully automatic processing machine, elevator type; 24' long x 9½' wide x 10½' high; 12 stations; arms are on 36" centers with a 36" lift. Arms suitable to carry racks or baskets. Tanks are 42" deep x 42" wide. Ma-
chine is complete with tanks, pipe coils, control panel, etc. This machine is suitable for phosphate coatings, chromate coatings, bright dipping, Alodine or any other chemical processing.

Both of these machines are very reasonably priced and available for immediate delivery.

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3 times	9.00
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READY-REFERENCE SECTION —USED EQUIPMENT AND SUPPLIES—

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POLISHING
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CLEANING
ANODIC TREATMENT
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I-HEAL-U OINTMENT for cyanide sore healing.
CHROME OINTMENT for chromium sore healing.
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Prices for any of above each \$1.00 — 4 oz.
Don't wait until you are suffering —
order your supply now.

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ANY QUANTITY
S. J. WILLIAMS

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PEERLESS PLATING COMPANY
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Phone 3-1815

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BRAND NEW G. E. RECTIFIERS in original crates.
Model 6RC138F11, copper oxide, 300 amps., 6 volts DC for 220/3/60 AC.
No controls.
SPECIAL PRICE: \$195.00 each — F.O.B. Cambridge, Mass.
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SITUATION OPEN — Distributors, jobbers and manufacturers agents wanted to distribute and sell the full line of Schaffner's polishing and buffing composition in bar, spray or paste form, and a complete line of polishing room supplies.

SCHAFFNER MANUFACTURING COMPANY,
INC.
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SITUATION OPEN — Sales representative wanted to sell complete line of metal finishing compounds. Alkaline cleaners, buffing compounds, solvents, plating solutions, additives and finishes in Eastern Massachusetts. Experience in industrial chemical or plating field required. Long established chemical manufacturer and distributor. Excellent benefits including car. Send resume to Box 387, Avon, Conn.

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SITUATION OPEN — Exceptional opportunity to the right man to assist in setting up new Udylite automatic chrome plating plant and supervise buffing, plating and painting departments. Must have previous experience in plating zinc die castings, brass barrel plating and dichromating and do own analysis on plating solutions.

We are an established company with AAA-1 rating. You will live and work in a clean, progressive Denver suburb, close to the mountains, with excellent schools and recreational facilities. If you meet the above qualifications, please give complete experience resume, date of availability, salary bracket and other information.

All replies held in strictest confidence.
NORGREN-STEMAC, INC.
1277 So. Cherokee St., Denver 23, Colo.

CHEMIST

SITUATION OPEN — Chemist for plating laboratory in large finishing company, Newark, N. J. Experience in analysis and control. Reply submitting full resume of experience to May 3, care Metal Finishing, 381 Broadway, Westwood, N. J.

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SITUATION OPEN — Salesman wanted for Los Angeles area, to sell plating and polishing equipment and supplies. Write, giving full information regarding qualifications, experience, etc. Address: April 2, care Metal Finishing, 381 Broadway, Westwood, N. J.

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SITUATION WANTED — Fourteen years experience in metal finishing, in positions of department head and chemist. Thorough knowledge of anodizing, plating, buffing, conversion coatings, painting and heat treating. Can control and maintain all baths and perform plant layout. Address: May 4, care Metal Finishing, 381 Broadway, Westwood, N. J.

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SITUATION WANTED — German technical University graduate analytical chemist, 49 years old, widowed, single. Now chief chemist with one of the leading midwest manufacturers of plating and finishing chemical products. Analysis, control, research, development. Address: May 6, care Metal Finishing, 381 Broadway, Westwood, N. J.

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SITUATION WANTED — Specialist in metal and all phases of industrial cleaning, and allied chemical specialties. Formulation, development, service, management, production, purchasing. Age 34. Salary minimum \$12,500. Address: May 5, care Metal Finishing, 381 Broadway, Westwood, N. J.

44th ANNUAL CONVENTION OF THE A. E. S. JUNE 16 — 20, 1957

MONTREAL BRANCH — HOST

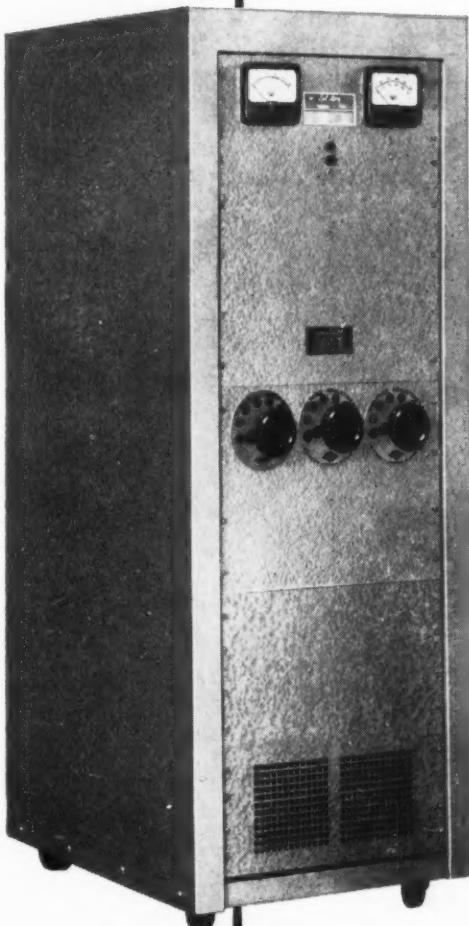
MONTREAL, CANADA

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"I tell you, Art, I never saw anything like it. They're soaking baskets of parts in a cleaner to remove some oil and dirt, and there's a thick film of oil floating right on top of the cleaning bath. And here's this guy pulling the baskets of parts out of the bath—right through the oil film—and picking up as much dirt and oil as they went in with. You should have seen the expression on Marty's face when I told him he wasn't cleaning the parts, he was re-oiling them!"

"Brother, if there ever was a natural for Metex T-103, this is it. What a chance to hammer home the point that you can cut costs and rejects... and improve the product finish... when parts are really clean before plating."

★
"You aren't cleaning those parts—*you're re-oiling them!*"



You'll be sold on Metex T-103, too once you get all the technical facts. Let a Mac Dermid representative put his know-how and experience to work helping solve your cleaning, plating and finishing problems.

"I got that all in, don't worry. And I mentioned how T-103 completely emulsifies oil soils... how fast it is in softening heavy grease deposits."

"How about T-103 in their barrel plating line?"

"Well, they have some lucite cylinders, so naturally they're interested in my point that T-103 operates well at temperatures as low as 150°F. And they've been having some trouble with cylinder perforations clogging, so I showed them how they can prevent clogging and increase plating efficiency with T-103."

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"When we can give them a cleaner that does a better job... and does it faster and more efficiently than the stuff they're using... how can they *not* be sold?"



MacDermid

...right to the Finish!

MacDermid Incorporated,
Waterbury 20, Connecticut

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